



Operation Manual



NUENDO 5

Advanced Post, Live and Audio Production System



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Welcome!

This is the Operation Manual for Steinberg's Nuendo. Here you will find detailed information about all the features and functions in the program.

About the program versions

The documentation covers two different operating systems or "platforms"; Windows and Mac OS X.

Some features and settings are specific to one of the platforms. This is clearly stated in the applicable cases. In other words:

⇒ If nothing else is said, all descriptions and procedures in the documentation are valid for both Windows and Mac OS X.

The screenshots are taken from the Windows version of Nuendo.

About the Nuendo Expansion Kit

The Nuendo Expansion Kit adds a number of music composition functions from Steinberg's Cubase (the "Cubase Music Tools") to the standard Nuendo application. The Nuendo Expansion Kit (NEK) is a separate product and can be purchased through your Steinberg dealer.

Whenever procedures in this manual use functions available only when the NEK is installed, this is indicated in the text by "Nuendo Expansion Kit only".

Key command conventions

Many of the default key commands in Nuendo use modifier keys, some of which are different depending on the operating system. For example, the default key command for Undo is [Ctrl]-[Z] under Windows and [Command]-[Z] under Mac OS X.

When key commands with modifier keys are described in this manual, they are shown with the Windows modifier key first, in the following way:

[Win modifier key]/[Mac modifier key]-[key]

For example, [Ctrl]/[Command]-[Z] means "press [Ctrl] under Windows or [Command] under Mac OS X, then press [Z]".

Similarly, [Alt]/[Option]-[X] means "press [Alt] under Windows or [Option] under Mac OS X, then press [X]".

⇒ Please note that this manual often refers to right-clicking, for example, to open context menus. If you are using a Mac with a single-button mouse, hold down [Ctrl] and click.

System requirements and installation

About this chapter

This chapter describes the requirements and installation procedures for the Windows version and the Mac version of Nuendo.

Minimum requirements

To use Nuendo, your computer must meet the following minimum requirements:

Windows

- Windows XP (Home or Professional, Service Pack 2, 32-bit), or Windows Vista (32-bit and 64-bit), or Windows 7 (32-bit and 64-bit)
- 2 GHz processor (Dual Core processor recommended)
- 1024MB RAM
- Windows DirectX compatible audio hardware; ASIO compatible audio hardware recommended for low latency performance.
- Display resolution of 1280x800 pixels recommended
- 4GB of free hard disk space
- QuickTime 7.1 and video card supporting OpenGL 1.2 (OpenGL 2.0 recommended) required for video playback
- USB-eLicenser and USB component connector
- DVD ROM drive required for installation
- Internet connection required for license activation

Macintosh

- Mac OS X 10.5.8 or 10.6
- Intel Core processor (Intel Core Duo recommended)
- 1024MB RAM
- CoreAudio compatible audio hardware
- Display resolution of 1280x800 pixels
- 4GB of free hard disk space
- QuickTime 7.1 and video card supporting OpenGL 1.2 (OpenGL 2.0 recommended) required for video playback
- USB-eLicenser and USB component connector
- DVD ROM drive required for installation
- Internet connection required for license activation

General notes on how to set up your system

⚠ On the Steinberg web site, under “Support–DAW Components”, you can find detailed information on what to consider when setting up a computer system dedicated to audio work.

- **RAM** – There is a direct relation between the amount of available RAM and the number of audio channels that you can have running.

The amount of RAM specified above is the minimum requirement, but as a general rule “the more the better” applies (see also “RAM” on [page 24](#)).

- **Hard disk size** – The size of the hard disk determines how many minutes of audio you will be able to record. Recording one minute of stereo CD quality audio requires 10 MB of hard disk space. That is, eight stereo tracks in Nuendo use up at least 80 MB of disk space per recording minute.

- **Hard disk speed** – The speed of the hard drive also determines the number of audio tracks you can run. That is the quantity of information that the disk can read, usually expressed as “sustained transfer rate”. Again, “the more the better” applies.

- **Wheel mouse** – Although a mouse without a wheel will work fine with Nuendo, we recommend that you use a wheel mouse.

This will speed up value editing and scrolling considerably.

MIDI requirements

If you intend to use the MIDI features of Nuendo, you need the following:

- A MIDI interface to connect external MIDI equipment to your computer.
- A MIDI instrument.
- Any audio equipment required to listen to the sound from your MIDI devices.

Audio hardware

Nuendo will run with audio hardware that meets the following specifications:

- Stereo.
- 16 bit.
- Support of at least the 44.1kHz sampling rate.
- Windows XP – The audio hardware must be supplied with a special ASIO driver, or a DirectX compatible driver, see below.

- Windows Vista/Windows 7 – If there is no dedicated ASIO driver available, you can also use the Generic Low Latency ASIO Driver.
- Mac – The audio hardware must be supplied with Mac OS X-compatible drivers (CoreAudio or ASIO).

Using the built-in audio hardware of the Macintosh (Mac only)

Although Nuendo is designed with multi-channel input and output in mind, it is of course possible to use the program with “basic” stereo inputs and outputs. As of this writing, all current Macintosh models provide at least built-in 16 bit stereo audio hardware. For detailed information, refer to the documentation describing your computer.

Depending on your preferences and requirements, using the built-in audio hardware may be sufficient for use with Nuendo. It is always available for selection in Nuendo – you do not have to install any additional drivers.

About drivers

A driver is a piece of software that allows a program to communicate with a certain piece of hardware. In this case, the driver allows Nuendo to use the audio hardware. For audio hardware, there are two different cases, requiring different driver configurations:

If the audio hardware has a specific ASIO driver

Professional audio cards often come with an ASIO driver written especially for the card. This allows for direct communication between Nuendo and the audio card. As a result, audio cards with specific ASIO drivers can provide lower latency (input-output delay), which is crucial when monitoring audio via Nuendo or using VST instruments. The ASIO driver may also provide special support for multiple inputs and outputs, routing, synchronization, etc.

Audio card-specific ASIO drivers are provided by the card manufacturers. Make sure to check the manufacturer's web site for the latest driver versions.

⚠ If your audio hardware comes with a specific ASIO driver, we strongly recommend that you use this.

If the audio card communicates via the Generic Low Latency ASIO driver (Windows Vista/Windows 7)

If you are working with Windows Vista or Windows 7, you can use the Generic Low Latency ASIO driver. This is a generic ASIO driver that provides ASIO support for all audio cards supported by Windows Vista and Windows 7, thus allowing for low latency. The Generic Low Latency ASIO driver provides the Windows Core Audio technology in Nuendo. No additional driver is needed.

⇒ Though the Generic Low Latency ASIO driver provides low latency for all audio cards, you might get better results with on-board audio cards than with external USB audio devices.

If the audio card communicates via DirectX (Windows only)

DirectX is a Microsoft “package” for handling various types of multimedia data under Windows. Nuendo supports DirectX, or to be more precise, DirectSound, which is a part of DirectX used for playing back and recording audio. This requires two types of drivers:

- A DirectX driver for the audio card, allowing it to communicate with DirectX. If the audio card supports DirectX, this driver should be supplied by the audio card manufacturer. If it isn't installed with the audio card, please check the manufacturer's web site for more information.
- The ASIO DirectX Full Duplex driver, allowing Nuendo to communicate with DirectX. This driver is included with Nuendo, and does not require any special installation.

Hardware installation

Copy protection

⚠ Please read the following section before installing the Nuendo software.

Many Steinberg products use the USB-eLicenser (also referred to as a “dongle”), a hardware copy protection device. Nuendo will not run if there is no USB-eLicenser containing an activated license.



The USB-eLicenser is a USB device on which your Steinberg software licenses are stored. All hardware-protected Steinberg products use the same type of device, and you can store more than one license on one device. Also, licenses can (within certain limits) be transferred between USB-Licensers – which is helpful, e.g. if you want to sell a piece of software.

The eLicenser Control Center (which can be found on the Start menu on Windows systems or the Applications folder on a Mac) is the place where you can check the licenses installed on your USB-eLicenser.

- If you are using other copy-protected Steinberg products, you may want to transfer all licenses for your applications to only one USB-eLicenser, thus using up only one USB port of your computer.

Please refer to the eLicenser Control Center Help for information on how to transfer licenses between USB-eLicensers.

- Nuendo is sold with an USB-eLicenser and an Activation Code, which is found on the Essential Product License Information card within the product package. The USB-eLicenser already contains a time-limited license that allows you to use Nuendo out-of-the-box for a total of 25 non-consecutive hours. However, to be able to make unlimited use of your version of Nuendo, you must activate your permanent license manually, using the activation code.

To do so, click the “Enter Activation Code” button of the eLicenser Control Center and follow the instructions.

- Steinberg software products always come with a license activation code, but not always with an USB-eLicenser.

If you want to activate a license for such a Steinberg software (e.g. an update/upgrade, or a VSTi) on the USB-eLicenser you received with your original version of Nuendo, click the “Enter Activation Code” button of the eLicenser Control Center and follow the instructions.

More information on the transfer or activation of licenses can be found in the help for the eLicenser Control Center.

Installing the audio hardware and its driver

1. Install the audio card and related equipment in the computer, as described in the card's documentation.

2. Install the driver for the card.

Depending on the operating system of your computer, there are different types of drivers that could apply: card-specific ASIO drivers, the Generic Low Latency ASIO Driver (Windows Vista/Windows 7 only), DirectX drivers (Windows) or Mac OS X (Mac) drivers.

Specific ASIO drivers

If your audio card has a specific ASIO driver, it may be included with the audio card, but you should always make sure to check the audio card manufacturer's web site for the most recent drivers. For details on how to install the driver, refer to the manufacturer's instructions.

Generic Low Latency ASIO Driver (Windows Vista/Windows 7 only)

On Windows Vista and Windows 7 systems, you can also use the Generic Low Latency ASIO Driver if there is no specific ASIO driver available. This driver is included with Nuendo and does not require any special installation.

DirectX drivers (Windows only)

If your audio card is DirectX compatible, its DirectX drivers will most likely be installed when you install the card. If you have downloaded special DirectX drivers for the audio card, you should follow the manufacturer's installation instructions.

Mac OS X drivers (Mac only)

If you are using a Macintosh computer, make sure that you are using the latest Mac OS X drivers for your audio hardware. Follow the manufacturer's instructions to install the driver.

Testing the card

To make sure that the audio card works as expected, perform the following tests:

- Use any software included with the audio card to make sure that you can record and play back audio without problems.
- If the card is accessed via a standard operating system driver, try playing back audio using the computer's standard audio application (e.g. Windows Media Player or Apple iTunes).

Installing a MIDI interface/synthesizer card

Installation instructions for a MIDI interface should be included with the product. However, here's an outline of the necessary steps:

1. Install the interface (or MIDI synthesizer card) in your computer or connect it to a "port" (connector) on the computer.

Which is right for you depends on which type of interface you have.

2. If the interface has a power supply and/or a power switch, turn it on.

3. Install the driver for the interface, as described in the documentation that comes with the interface.

You should also make sure to check the manufacturer's web site for the latest driver updates.

Installing Nuendo

The installation procedure puts all files in the right places, automatically.

Depending on your system, the Nuendo 5 Start Center program on the DVD may start automatically. If no interactive start screen appears, open the DVD and double-click the file "Nuendo 5 Start Center" to launch the interactive start screen. From there you can start the installation of Nuendo and browse through the additional options and information presented there.

In case you do not want to install Nuendo via the interactive start screen, follow the procedure below:

Windows


1. Double-click the file called Setup.exe.
2. Follow the instructions on screen.

Macintosh

1. Double-click the file called "Nuendo 5.mpkg".
2. Follow the instructions on screen.

Defragmenting the hard disk (Windows only)

If you plan to record audio on a hard disk where you have already stored other files, now is the time to defragment it. Defragmentation reorganizes the physical allocation of space on the hard disk in order to optimize its performance. It is done with a special defragmentation program.

-  It is crucial to the audio recording performance that your hard disk is optimized (defragmented). You should make sure to defragment regularly.

Register your software

We encourage you to register your software! By doing so you are entitled to technical support and kept aware of updates and other news regarding Nuendo.

To register your software, proceed as follows:

- In Nuendo, open the Help menu and select the Registration option.
This option is an Internet link that will open the Registration page of the Steinberg web site. To register, simply follow the instructions on screen.
- When you launch Nuendo, you will also be prompted to launch the registration process.

Setting up audio

⚠ Make sure that all equipment is turned off before making any connections!

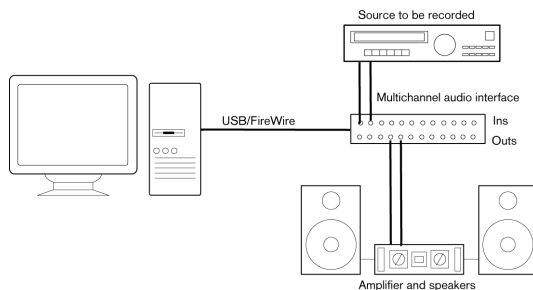
Connecting audio

Exactly how to set up your system depends on many different factors, e.g. the kind of project you wish to create, the external equipment you want to use, or the computer hardware available to you. Therefore, the following sections can only serve as examples.

How you connect your equipment, i.e. whether you use digital or analog connections, also depends on your individual setup.

Stereo input and output – the simplest connection

If you only use a stereo input and output from Nuendo, you can connect your audio hardware, e.g. the inputs of your audio card or your audio interface, directly to the input source and the outputs to a power amplifier and speaker.



A simple stereo audio setup

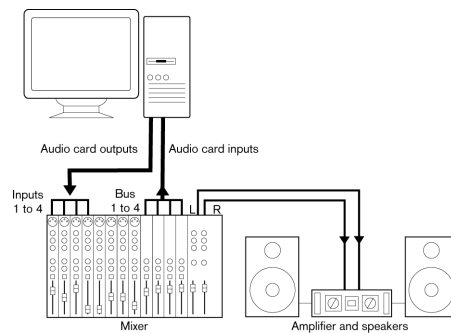
This is probably the simplest of all setups – once you have set up the internal input and output busses, you can connect your audio source, e.g. a microphone, to your audio interface and start recording.

Multi-channel input and output

Most likely however, you will have other audio equipment that you want to integrate with Nuendo, using several input and output channels. Depending on the equipment available to you, there are two ways to go: either mixing using an external mixing desk, or mixing using the Mixer inside Nuendo.

- External mixing means having a hardware mixing device with a group or bus system that can be used for feeding inputs on your audio hardware.

In the example below, four busses are used for feeding signals to the audio hardware's inputs. The four outputs are connected back to the mixer for monitoring and playback. Remaining mixer inputs can be used for connecting audio sources like microphones, instruments, etc.

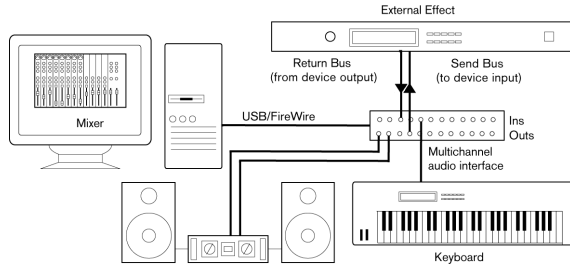


A multi-channel audio setup using an external mixer

⇒ When connecting an input source (like a mixer) to the audio hardware, you should use output busses, sends or similar that are separate from the mixer's master output to avoid recording what you are playing back. You may also have mixing hardware that can be connected via FireWire.

- When using the Mixer inside Nuendo, you can use the inputs on your audio hardware to connect microphones and/or external devices. Use the outputs to connect your monitoring equipment.

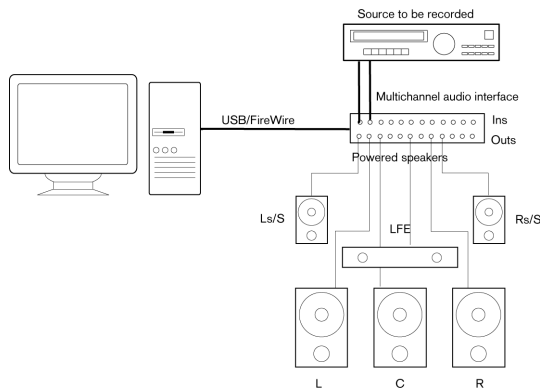
You can create very complex setups using external instruments and external effects, and integrate Nuendo seamlessly with all your external equipment using the Control Room feature (see the chapters “VST Connections” on page 27 and “Control Room” on page 179).



Mixing inside Nuendo

Connecting for surround sound

If you plan to mix for surround sound, you can connect the audio outputs to a multi-channel power amplifier, driving a set of surround channels.



A surround sound playback configuration

Nuendo supports a number of surround formats. The example connection above will work for mixing both LRCS (ProLogic for example) and 5.1, in which case the two surround speakers will be playing the same material (from the single surround channel). The difference between the two formats is the LFE channel, which is not used with LRCS.

Recording from a CD player

Most computers come with a CD-ROM drive that can also be used as a regular CD player. In some cases the CD player is internally connected to the audio hardware so that you can record the output of the CD player directly into Nuendo (consult the audio hardware documentation if you are uncertain).

- All routing and level adjustments for recording from a CD (if available) are done in the audio hardware setup application (see below).
- You can also grab audio tracks directly from a CD in Nuendo (see the chapter “File handling” on page 552).

Word clock connections

If you are using a digital audio connection, you may also need a word clock connection between the audio hardware and external devices. Please refer to the documentation that came with the audio hardware for details.

- ⚠ It is very important that word clock synchronization is done correctly or there might be clicks and crackles in recordings that you make!

About recording levels and inputs

When you connect your equipment, you should make sure that the impedance and levels of the audio sources and inputs are matched. Typically, different inputs may be designed for use with microphones, consumer line level (-10dBV) or professional line level (+4dBV), or you may be able to adjust input characteristics on the audio interface or in its control panel. Please check the audio hardware documentation for details.

Using the correct types of input is important to avoid distortion or noisy recordings.

- ⚠ Nuendo does not provide any input level adjustments for the signals coming in to your audio hardware, since these are handled differently for each card. Adjusting input levels is either done in a special application included with the hardware or from its control panel (see below).

Making settings for the audio hardware

Most audio cards come with one or more small applications that allow you to configure the inputs of the hardware to your liking. This includes:

- Selecting which inputs/outputs are active.
- Setting up word clock synchronization (if available).
- Turning monitoring via the hardware on/off (see ["About monitoring"](#) on page 21).
- Setting levels for each input. This is very important!
- Setting levels for the outputs, so that they match the equipment you use for monitoring.
- Selecting digital input and output formats.
- Making settings for the audio buffers.

In many cases all available settings for the audio hardware are gathered in a control panel, which can be opened from within Nuendo as described below (or opened separately, when Nuendo isn't running). In some cases, there may be several different applications and panels – please refer to the audio hardware documentation for details.

Plug and Play support for ASIO devices

The Steinberg MR816 hardware series supports Plug and Play in Nuendo. These devices can be plugged in and switched on while the application is running. Nuendo will automatically use the driver of the MR816 series and will re-map the VST connections accordingly.

Steinberg cannot guarantee that this will work with other hardware. If you are unsure of whether your device supports plug and play, please consult its documentation.

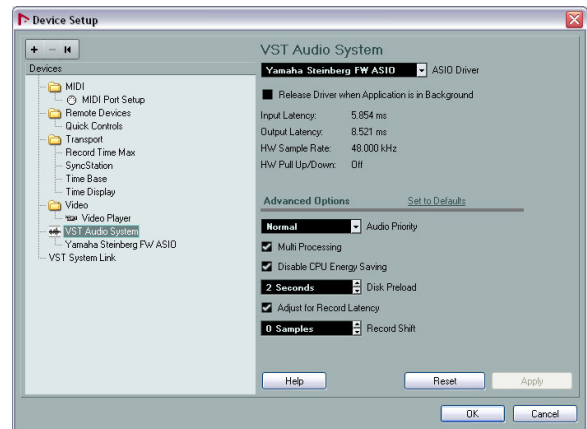
- ⚠ If a device that does not support Plug and Play is connected/disconnected while the computer is running, it may get damaged.

Selecting a driver and making audio settings in Nuendo

The first thing you need to do is select the correct driver in Nuendo to make sure that the program can communicate with the audio hardware:

1. Launch Nuendo and select Device Setup from the Devices menu.
2. In the Devices list to the left, click on "VST Audio System".

The VST Audio System page is shown.



3. On the ASIO Driver menu, select your audio hardware driver.

There may be several options here that all refer to the same audio hardware. When you have selected a driver, it is added to the Devices list.

- ⚠ Under Windows, we strongly recommend that you access your hardware via an ASIO driver written specifically for the hardware. If no ASIO driver is installed, we recommend that you check with your audio hardware manufacturer if they have an ASIO driver available, for example, for download via the Internet.

- ⚠ On Windows Vista and Windows 7 systems, you can also use the Generic Low Latency ASIO driver if no specific ASIO driver is available.

4. Select the driver in the Devices list to open the driver settings for your audio hardware.

5. Bring up the control panel for the audio hardware and adjust the settings as recommended by the audio hardware manufacturer.

- Under Windows, you open the control panel by clicking the Control Panel button.

The control panel that opens when you click this button is provided by the audio hardware manufacturer – not Nuendo (unless you use DirectX, see below). Hence it will be different for each audio card brand and model.

The control panels for the ASIO DirectX driver and the Generic Low Latency ASIO Driver (Windows Vista and Windows 7 only) are exceptions, in that they are provided by Steinberg and described in the dialog help, opened by clicking the Help button in the dialog. See also the notes on DirectX below.

- Under Mac OS X, the control panel for your audio hardware is opened by clicking the “Open Config App” button on the settings page for your audio device in the Device Setup dialog.

Note that this button is available only for some hardware products. If “Open Config App” is not available in your setup, refer to the documentation that came with your audio hardware for information on where to make hardware settings.

6. If you plan to use several audio applications simultaneously, you may want to activate the “Release Driver when Application is in Background” option on the VST Audio System page. This will allow another application to play back via your audio hardware even though Nuendo is running.

The application that is currently active (i.e. the “top window” on the desktop) gets access to the audio hardware. Make sure that any other audio application accessing the audio hardware is also set to release the ASIO (or Mac OS X) driver so Nuendo can use it when it becomes the active application again.

7. On the page for the driver, activate the Externally Clocked option if your audio hardware receives clock signals from an external sample clock source.

You should “tell” Nuendo that it receives external clock signals and therefore derives its speed from that source. It is essential that you set Nuendo’s project sample rate to the sample rate of the incoming clock signals for proper audio playback and recording, see [“The Project Setup dialog”](#) on [page 57](#).

8. If your audio hardware and its driver support ASIO Direct Monitoring, you may want to activate the Direct Monitoring checkbox on the page for the driver. Read more about monitoring later in this chapter and in the chapter [“Recording”](#) on [page 90](#).

9. Click Apply and then OK to close the dialog.

If you are using audio hardware with a DirectX driver (Windows only)

- ⚠ If your audio hardware does not have a specific ASIO driver and your Windows version does not support the Generic Low Latency ASIO driver, a DirectX driver is the next best option.

Nuendo comes with a driver called ASIO DirectX Full Duplex, available for selection on the ASIO Driver pop-up menu (VST Audio System page).

⇒ To take full advantage of DirectX Full Duplex, the audio hardware must support WDM (Windows Driver Model) in combination with DirectX version 8.1 or higher. In all other cases, the audio inputs will be emulated by DirectX (see the dialog help for the ASIO DirectX Full Duplex Setup dialog for details about how this is reported).

⇒ During the installation of Nuendo, the latest DirectX version will be installed on your computer.

When the ASIO DirectX Full Duplex driver is selected in the Device Setup dialog, you can open the ASIO Control Panel and adjust the following settings (for more details, click the Help button in the control panel):

- Direct Sound Output and Input Ports

In the list on the left in the window, all available Direct Sound output and input ports are listed. In many cases, there will be only one port in each list. To activate or deactivate a port in the list, click the checkbox in the left column. If the checkbox is ticked, the port is activated.

- You can edit the Buffer Size and Offset settings in this list if necessary, by double-clicking on the value and typing in a new value.

In most cases, the default settings will work fine. Audio buffers are used when audio data is transferred between Nuendo and the audio card.

While larger buffers ensure that playback will occur without glitches, the latency (the time between the moment Nuendo sends out the data and when it actually reaches the output) will be higher.

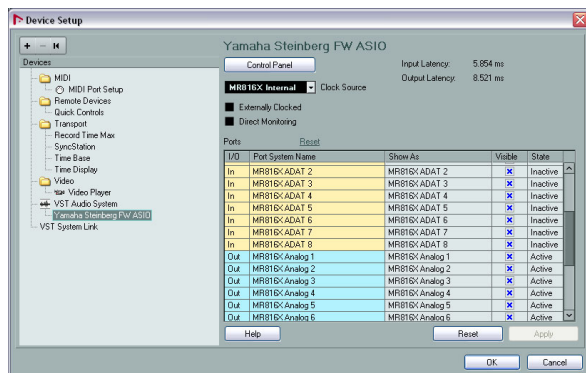
- Offset

If a constant offset is audible during playback of Audio and MIDI recordings, you can adjust the output or input latency time using this value.

Setting up the input and output ports

Once you have selected the driver and made the settings as described above, you need to specify which inputs and outputs will be used and name these:

1. In the Device Setup dialog, select your driver in the Devices list on the left to display the driver settings for your audio hardware.



All input and output ports on the audio hardware are listed.

2. To hide a port, click in the “Visible” column for the port (deselecting the checkbox).

Ports that are not visible cannot be selected in the VST Connections window where you set up your input and output busses – see the chapter “VST Connections” on [page 27](#).

⚠ If you attempt to hide a port that is already used by a bus you will be asked whether this is really what you want – note that this will disable the port!

3. To rename a port, click on its name in the “Show as” column and type in a new name.

- It is a good idea to give your ports names that are related to the channel configuration (rather than to the actual hardware model)!

For example, if you are using a 5.1 surround audio setup, you could name the six ports Left, Right, Center, Lfe, Left Surround, and Right Surround. This makes it easier to transfer your projects between different computers, e.g. in different studios – if the same port names are used on both computers, Nuendo will automatically handle the bus connections properly when you open the project on the other computer.

4. Click OK to close the Device Setup dialog and apply your changes.

About monitoring

In Nuendo, monitoring means listening to the input signal while preparing to record or while recording. There are three ways to monitor:

External monitoring

External monitoring (listening to the input signal before it goes into Nuendo) requires an external mixer for mixing the audio playback with the input signal. This can be a classic mixing desk or a mixer application for your audio hardware, if this has a mode in which the input audio is sent back out again (usually called “Thru”, “Direct Thru” or similar).

Via Nuendo

In this case, the audio passes from the input into Nuendo, possibly through Nuendo effects and EQ and then back to the output. You control monitoring via settings in Nuendo.

This allows you to control the monitoring level from Nuendo and add effects to the monitored signal only.

ASIO Direct Monitoring

If your audio hardware is ASIO 2.0 compatible, it may support ASIO Direct Monitoring (this feature may also be available for audio hardware with Mac OS X drivers). In this mode, the actual monitoring is done in the audio hardware, by sending the input signal back out again. However, monitoring is controlled from Nuendo. This means that the audio hardware’s direct monitoring feature can be turned on or off automatically by Nuendo.

Monitoring is described in detail in the chapter “[Recording](#)” on [page 90](#). However, when setting up, there is one thing to note:

- If you want to use the external monitoring via your audio hardware, make sure that the corresponding functions are activated in the card’s mixer application.

⇒ If you are using RME Audio Hammerfall DSP audio hardware, make sure that the pan law is set to -3dB in the card’s preferences.

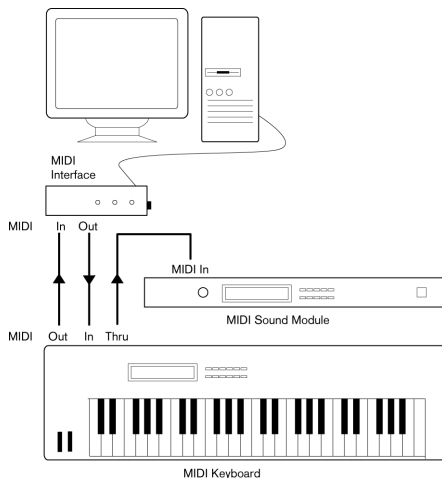
Setting up MIDI

⚠ Make sure that all equipment is turned off before making any connections!

This section describes how to connect and set up MIDI equipment. If you have no MIDI equipment, you can skip this section. Note that this is only an example – you might need or want to hook things up differently!

Connecting the MIDI equipment

In this example we assume that you have a MIDI keyboard and an external MIDI sound module. The keyboard is used both for feeding the computer with MIDI messages for recording and for playing back MIDI tracks. The sound module is used for playback only. Using Nuendo's MIDI Thru feature (described later) you will be able to hear the correct sound from the sound module while playing the keyboard or recording.



A typical MIDI Setup

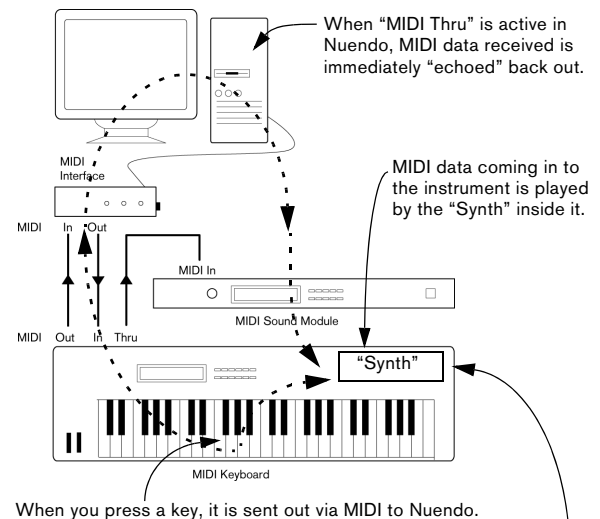
If you want to use even more instruments for playback, simply connect MIDI Thru on the sound module to MIDI In on the next instrument, and so on. In this hook-up, you will always play the first keyboard when recording. But you can still use all your devices for providing sounds on playback.

⚠ If you plan to use more than three sound sources, we recommend that you either use an interface with more than one output, or a separate MIDI Thru box instead of the Thru jacks on each unit.

Setting MIDI Thru and Local On/Off

On the MIDI page in the Preferences dialog (located on the File menu under Windows and on the Nuendo menu under Mac OS X), you will find a setting called "MIDI Thru Active". This is related to a setting in your instrument called "Local On/Off" or "Local Control On/Off".

- If you use a MIDI keyboard instrument, as described earlier in this chapter, MIDI Thru should be activated and that instrument should be set to Local Off (sometimes called Local Control Off – see the instrument's operation manual for details). The MIDI signal from the keyboard will be recorded in Nuendo and at the same time be re-routed back to the instrument so that you hear what you are playing, without the keyboard "triggering" its own sounds.



When Local Control is turned on in the instrument, the keys you press will be played by the "Synth" inside the instrument. When Local Control is turned off, this connection is cut off.

- If you use a separate MIDI keyboard – one that does not produce any sounds itself – MIDI Thru in Nuendo should also be activated, but you don't need to look for any Local On/Off setting in your instruments.
- The only case where MIDI Thru should be deactivated is if you use Nuendo with only one keyboard instrument and that instrument cannot be set to Local Off mode.
- MIDI Thru will be active only for MIDI tracks that are record enabled and/or have the Monitor button activated. See the chapter "Recording" on [page 90](#) for more information.

Setting up MIDI ports in Nuendo

The Device Setup dialog lets you set up your MIDI system as follows:

⇒ When you change MIDI port settings in the Device Setup dialog, these are automatically applied.

Showing or hiding MIDI Ports

The MIDI ports are listed in the Device Setup dialog on the MIDI Port Setup page. By clicking in the “Visible” column for a MIDI input or output, you can specify whether or not it is listed on the MIDI pop-up menus in the program.

If you are trying to hide a MIDI port which is already selected for a track or a MIDI device, a warning message will appear, allowing you to hide – and disconnect – the port or to cancel the operation and keep the MIDI port visible.

Setting up the “All MIDI Inputs” option

When you record MIDI in Nuendo, you can specify which MIDI input each recording MIDI track should use. However, you can also select the “In ‘All MIDI Inputs’” option for an input port, which causes any MIDI data from any MIDI input to be recorded.

The “In ‘All MIDI Inputs’” option on the MIDI Port Setup page allows you to specify which inputs are included when you select All MIDI Inputs for a MIDI track. This can be especially useful if your system provides several instances of the same physical MIDI input – by deactivating the duplicates you make sure only the desired MIDI data is recorded.

⇒ If you have a MIDI remote control unit connected, you should also make sure to deactivate the “In ‘All MIDI Inputs’” option for that MIDI input. This will avoid accidentally recording the data from the remote control when the “All MIDI Inputs” option is selected as input for a MIDI track.

Connecting a synchronizer

⚠ Make sure that all equipment is turned off before making any connections!

When using Nuendo with external tape transports, you will most likely need to add a synchronizer to your system. All connections and setup procedures for synchronization are described in the chapter “[Synchronization](#)” on [page 496](#).

Setting up video

Nuendo plays back video files in a number of formats, such as AVI, QuickTime, or MPEG. QuickTime is used as playback engine. Which formats can be played back depends on the video codecs installed on your system, see the chapter “[Video](#)” on [page 520](#).

There are several ways to play back video, e.g. without any special hardware, using a FireWire port, or using dedicated video cards, see “[Video output devices](#)” on [page 522](#).

If you plan to use special video hardware, install it and set it up as recommended by the manufacturer.

Before you use the video hardware with Nuendo, we recommend that you test the hardware installation with the utility applications that came with the hardware and/or the QuickTime Player application.

Optimizing audio performance

This section gives you some hints and tips on how to get the most out of your Nuendo system, performance-wise. Some of this text refers to hardware properties and can be used as a guide when upgrading your system. This text is very brief. Look for details and current information on the Nuendo web site!

Two aspects of performance

There are two distinct aspects of performance with respect to Nuendo.

Tracks and effects

Simply put: the faster your computer, the more tracks, effects and EQ you will be able to play. Exactly what constitutes a “fast computer” is almost a science in itself, but some hints are given below.

Short response times (latency)

Another aspect of performance is response time. The term “latency” refers to the “buffering”, i.e. the temporary storing, of small chunks of audio data during various steps of the recording and playback process on a computer. The more and larger those chunks, the higher the latency.

High latency is most irritating when playing VST instruments and when monitoring through the computer, i.e. when listening to a live audio source via the Nuendo Mixer and effects. However, very long latency times (several hundred milliseconds) can also affect other processes like mixing, e.g. when the effect of a fader movement is heard only after a noticeable delay.

While Direct Monitoring and other techniques reduce the problems associated with very long latency times, a system that responds fast will always be more convenient to work with.

- Depending on your audio hardware, it may be possible to “trim” your latency times, usually by lowering the size and the number of buffers.

For details, refer to the audio hardware documentation, or, if you are using a DirectX driver under Windows, the dialog help.

System factors that affect performance

RAM

Generally speaking, the more RAM is installed in your computer, the better.

- ⚠ On computers running a Windows 32Bit operating system, a running application can address a maximum of 2GB of RAM. On a Macintosh computer running Mac OS X, this limit is 4GB.

This limitation is imposed by the operating system, and it is independent of the amount of RAM that you may have installed in your computer!

- ⇒ Only Windows 64Bit is able to assign considerably more than 4GB of RAM to a running application.

Some program functions may “eat up” all the available memory, e.g. recording, the use of effect plug-ins, and the pre-loading of samples (see also [“RAM requirements for recording”](#) on [page 94](#) and [“Smart plug-in processing”](#) on [page 196](#)).

- ⚠ When a function has used up all the memory made available by the operating system, the computer will crash.

Always keep in mind the RAM limitation of your operating system when setting up your projects.

CPU and processor cache

It goes without saying that the faster the computer processor, the better. But there are a number of factors that affect the apparent speed of a computer: the bus speed and type (PCI is strongly recommended), the processor cache size and of course, the processor type and brand. Nuendo relies heavily on floating point calculations. When shopping for a processor, please make sure that you get one that is powerful in calculating floating point arithmetics.

Note also that Nuendo features full support for multi-processor systems. So, if you own a computer system with more than one processor, Nuendo can take advantage of the total capacity and evenly distribute the processing load to all available processors. For further information, see [“The advanced options”](#) on [page 25](#).

Hard disk and controller

The number of hard disk tracks you can record and play back at the same time also depends on the speed of your hard disk and hard disk controller. If you use E-IDE disks and controllers, make sure that the transfer mode is DMA Busmaster. Under Windows, you can check the current mode by launching the Windows Device Manager and looking for properties of the IDE ATA/ATAPI Controller's primary and secondary channel. DMA transfer mode is enabled by default, but may be turned off by the system should hardware problems occur.

Audio hardware and driver

The hardware and its driver can have some effect on regular performance. A badly written driver can reduce the performance of your computer. But where the hardware driver design makes the most difference is with latency.

⚠ Again, we strongly recommend that you use audio hardware for which there is a specific ASIO driver!

This is especially true when using Nuendo for Windows:

- Under Windows, ASIO drivers written specifically for the hardware are more efficient than the Generic Low Latency ASIO Driver or a DirectX driver and produce shorter latency times.
- Under Mac OS X, audio hardware with properly written Mac OS X (Core Audio) drivers can be very efficient and produce very low latency times.
However, there are additional features currently only available with ASIO drivers, such as the ASIO Positioning Protocol.

Optimizing processor scheduling (Windows only)

To get the lowest possible latencies when using ASIO under Windows XP (on a single-CPU system), the “system performance” has to be optimized for background tasks:

1. Open the Windows Control Panel from the Start menu and select System.
2. Select the Advanced tab and click the Settings button in the Performance section.
The Performance Options dialog opens.
3. Select the Advanced tab.
4. In the Processor Scheduling section, select “Adjust for best performance of: Background services”.
5. Click OK to close the dialogs.

Making settings that affect performance

Audio buffer settings

Audio buffers affect how audio is sent to and from the audio hardware. The size of the audio buffers affects both the latency and the audio performance. Generally, the smaller the buffer size, the lower the latency. On the other hand, working with small buffers can be demanding for the computer. If the audio buffers are too small, you may get clicks, pops or other audio playback problems.

- Under Mac OS X, you can adjust the size of the buffers on the VST Audio System page in the Device Setup dialog.

You may also find buffer settings in the control panel for the audio hardware.

- Under Windows, you adjust the buffer size settings in the control panel for the audio hardware (opened by clicking the Control Panel button on the driver page in the Device Setup dialog).

The advanced options

On the VST Audio System page you will find the “Advanced options” section. Here you find advanced settings for the VST Engine, including a Multi Processing option. When this is activated and there is more than one CPU in your system, the processing load is distributed evenly to all available CPUs, allowing Nuendo to make full use of the combined power of the multiple processors. See the dialog help for details.

About the VST Performance window



The VST Performance window is opened from the Devices menu. The window shows two meter displays: The ASIO meter, which indicates CPU load, and the Disk meter, which shows the hard disk transfer rate. It is recommended that you check this from time to time, or keep it always open. Even if you have been able to activate a number of audio channels in the project without getting any warning, you may run into performance problems when adding EQ or effects.

- The ASIO meter (at the top) shows the ASIO time usage, i.e. the time required to complete the current processing tasks. The more tracks, effects, EQ, etc. you use in your project, the longer processing will take, and the longer the ASIO meter will show activity.

If the overload indicator (on the far right) lights up, you need to decrease the number of EQ modules, active effects, and/or audio channels playing back simultaneously.

- The lower bar graph shows the hard disk transfer load. If the overload indicator (on the far right) lights up, the hard disk is not supplying data fast enough to the computer. You may need to reduce the number of tracks playing back by using the Disable Track function (see ["About track disable/enable"](#) on [page 87](#)). If this does not help, you need a faster hard disk.

⇒ The overload indicator may occasionally blink, e.g. when you locate during playback. This does not indicate a problem, but happens because the program needs a moment for all channels to load data for the new playback position.

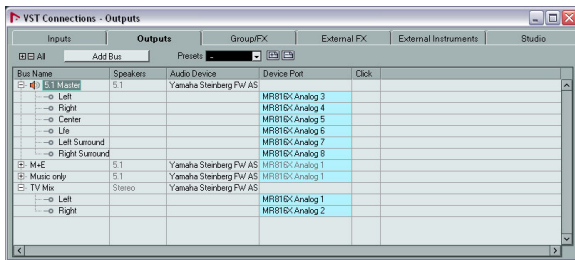
⇒ The ASIO and Disk load meters can also be shown on the Transport panel (as "Performance") and on the Project window toolbar (as "Performance Meter"). There they are shown as two miniature vertical meters (by default at the left side of the panel/toolbar).

About this chapter

This chapter focuses on the settings you can perform in the VST Connections window. Here you can set up input and output busses, group and FX channels, external effects, and external instruments. Furthermore you can use this window to configure the Control Room and access the Control Room itself.

Since input and output busses are vital for working with Nuendo, a large part of this chapter concentrates on busses and this is also the reason why you find this chapter at the beginning of the Operation Manual. How to use the busses is described in detail in the section [“Routing”](#) on [page 168](#).

The VST Connections window



The VST Connections window is opened from the Devices menu. It contains the following tabs:

- The Inputs and Outputs tabs allow you to set up and configure input and output busses, see [“Setting up busses”](#) on [page 28](#).
- The Group/FX tab allows you to create group and FX channels/tracks and to make output assignments for these, see [“Setting up group and FX channels”](#) on [page 32](#).
- The External FX tab allows you to create effect send/return busses for connecting external effects which can then be selected via the effect pop-up menus from inside the program. For further information, see [“External instruments/effects”](#) on [page 32](#) and [“Using external effects”](#) on [page 208](#).
- The External Instruments tab allows you to create input/output busses for connecting external instruments. For further information, see [“External instruments/effects”](#) on [page 32](#) and the chapter [“VST instruments and instrument tracks”](#) on [page 215](#).
- The Studio tab is where you enable and configure the Control Room, see [“VST Connections – Studio tab”](#) on [page 181](#).

Setting up busses

Nuendo uses a system of input and output busses to transfer audio between the program and the audio hardware.

- Input busses let you route audio from the inputs on your audio hardware into the program. This means that when you record audio, you will always do this through one or several input busses.
- Output busses let you route audio from the program to the outputs on your audio hardware. When you play back audio, you will always do this through one or several output busses.

Once you understand the bus system and know how to set up the busses properly, it will be easy to go on with recording, playing back, mixing, and doing surround work.

Strategies

You can create any number of busses in Nuendo, in virtually any channel configuration – mono, stereo or a number of surround formats.

⇒ The bus configuration is saved with the project – therefore it is a good idea to add and set up the busses you need and save these in a template project (see [“Save as Template”](#) on [page 53](#)).

When you start working on new projects, you start from this template. That way you get your standard bus configuration without having to make new bus settings for each new project. If you need to work with different bus configurations in different projects, you can either create several different templates or store your configurations as presets (see [“Presets”](#) on [page 31](#)). The templates can of course also contain other settings that you regularly use – sample rate, record format, a basic track layout, etc.

So, which type of busses do you need? This depends on your audio hardware, your general audio setup (e.g. surround speaker setup) and what kind of projects you work with.

Let's say you are using audio hardware with eight analog inputs and outputs and digital stereo connections (10 inputs and outputs all in all). Furthermore, you work with a surround setup in 5.1 format. In this scenario, you may want to add the following busses:

Input busses

- Most likely you need at least one stereo input bus assigned to an analog input pair. This will let you record stereo material. If you want to be able to record in stereo from other analog input pairs as well, you add stereo input busses for these, too.
- Although you can record mono tracks from one side of a stereo input, it may be a good idea to add a dedicated mono input bus. This can be assigned to an analog input to which you have connected a dedicated microphone pre-amp, for example. Again, you can have several different mono busses.
- You probably want a dedicated stereo input bus assigned to the digital stereo input, for digital transfers.
- If you want to transfer surround material directly to a surround track, e.g. from surround-configured location recording equipment, you need an input bus in that surround format – in this example, this will be a 5.1 input bus.

Output busses

- You will need one or several stereo output busses for routing stereo mixes to master recorders or other destinations.
- For digital transfers, you need a stereo bus assigned to a digital stereo output as well.
- You need a surround bus in the format of your speaker configuration (in this example, 5.1) assigned to the correct outputs. Only connect these outputs to the corresponding speakers if you are not using the Control Room (see the chapter "[Control Room](#)" on [page 179](#)). You may want additional surround busses if you tend to work in different surround formats.

⚠ Different busses can use the same inputs/outputs on the audio hardware! For example, you may want a stereo output bus assigned to the same outputs as the front stereo channels in your surround bus – this enables you to listen to stereo mixes without having to reconnect your speakers.

Preparations

Before you set up busses, you should name the inputs and outputs on your audio hardware. For example, if you are using a 5.1 surround speaker setup, you should name the outputs according to which speaker they are connected to (Left, Right, Center, and so on).

The reason for this is compatibility – it makes it easier to transfer projects between different computers and setups. For example, if you move your project to another studio, the audio hardware may be of a different model. But if both you and the other studio owner have given your inputs and outputs names according to the surround setup (rather than names based on the audio hardware model), Nuendo will automatically find the correct inputs and outputs for your busses and you will be able to play and record without having to change the settings.

To assign names to the inputs and outputs of your audio hardware, proceed as follows:

1. Open the Device Setup dialog from the Devices menu.
2. On the VST Audio System page, make sure that the correct driver for your audio hardware is selected. If this is the case, your audio card is listed in the Devices list on the left of the Device Setup window.
3. In the Devices list, select your audio card. The available input and output ports on your audio hardware are listed on the right.
4. To rename a port, click on its name in the Show As column and enter a new name.

- If needed, you can also disable ports by deactivating them in the Visible column.

Disabled ports are not shown in the VST Connections window. If you attempt to disable a port that is used by a bus, you will be asked whether this is really what you want – note that this will remove the port from the bus!

5. Click OK to close the Device Setup dialog.

⇒ If you open a project created on another computer and the port names do not match (or the port configuration is not the same – e.g. the project is created on a system with multi-channel i/o and you open it on a stereo in/out system), the Missing Ports dialog will appear. This allows you to manually re-route ports used in the project to ports available in your system.

Mac OS X only: Retrieving channel names

For some audio cards, you can automatically retrieve the ASIO channel names for the ports of your audio hardware. Proceed as follows:

1. Open the Device Setup dialog via the Devices menu.
2. On the VST Audio System page, select your audio card on the ASIO Driver pop-up menu.
3. In the Devices list on the left, select your audio card. The available settings are displayed.
4. In the settings section on the right, click the Control Panel button.
5. In the control panel for your audio hardware, activate the “Use CoreAudio Channel Names” option.
6. When you now open the VST Connections window to set up the busses in your system, you will find that the port names in the Device Port column correspond to the names that are used by the CoreAudio driver.

⇒ If you want to use the project later on with an earlier version of Nuendo, you will have to re-assign the port connections in the VST Connections window (see below).

Mac OS X only: Port selection and activation

On the settings page for your audio card (opened via the Device Setup dialog, see above), you can specify which input and output ports are active. This allows you to use the Microphone input instead of the Line input or even to deactivate the audio card input or output completely, if required.

⇒ This function is only available for Built-In Audio, standard USB audio devices and a certain number of other audio cards (e.g. Pinnacle CineWave).

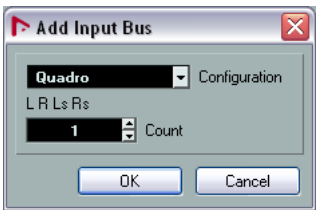
Adding input and output busses

Depending on whether you have selected the Inputs or the Outputs tab in the VST Connections window, the corresponding busses are listed, with the following information:

Column	Description
Bus Name	Lists the busses. You can select and rename busses by clicking on them in this column.
Speakers	Indicates the speaker configuration (mono, stereo, surround formats) of each bus.
Audio Device	This shows the currently selected ASIO driver.
Device Port	If a bus entry is expanded to show all speaker channels, this column shows which physical inputs/outputs on your audio hardware are used by the bus. If the bus entry is collapsed, only the first port used by this bus is visible here.
Click (Outputs tab only)	You can route the click to a specific output bus, regardless of the actual Control Room output, or even when the Control Room is disabled.

To add an input or output bus, proceed as follows:

1. Open the Inputs or Outputs tab depending on the type of bus that you want to add.
2. Click the Add Bus button.
A dialog opens.

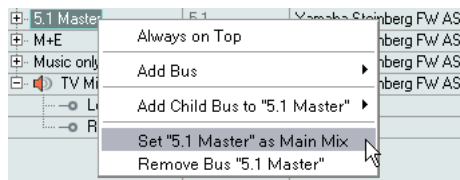


3. Select a (channel) configuration.
The Configuration pop-up menu contains a Mono and a Stereo option as well as several surround formats. Additional surround formats are listed on the “More...” submenu.
 - Alternatively, you can right-click in the VST Connections window and add a bus in the desired format directly from the context menu.
The new bus appears with the ports visible.
4. For each of the speaker channels in the bus, click in the Device Port column to select a port on your audio hardware.
The pop-up menu that opens lists the ports with the names you have assigned in the Device Setup dialog.

Setting the Main Mix bus (the default output bus)

The Main Mix is the output bus that each new audio, group or FX channel is automatically routed to.

Any of the output buses in the VST Connections window can be the default output bus. By right-clicking on the name of an output bus, you can set it as the Main Mix bus.



Setting the default output bus.



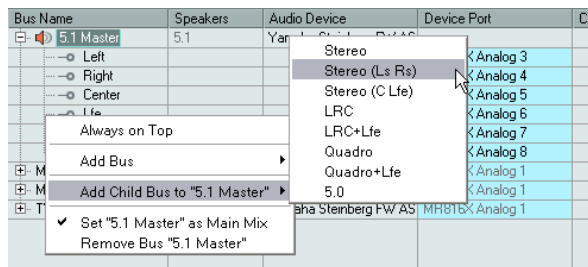
The Main Mix is indicated by an orange colored speaker icon next to its name.

Adding child busses

A surround bus is essentially a set of mono channels – 6 channels in the case of the 5.1 format. If you have a mono track in the project, you can route it to a separate speaker channel in the bus (or route it to the parent surround bus and use the SurroundPanner to position it in the surround image). But what if you have a stereo track that you simply want to route to a stereo channel pair within the bus (Left and Right or Left Surround and Right Surround, for example)? For this you need to create a child bus.

Proceed as follows:

1. In the Bus Name column, select the surround bus and right-click on it to open the context menu.



2. Select a channel configuration from the “Add Child Bus” submenu.

As you can see, you can create stereo child busses (routed to various speaker channel pairs in the surround bus) or other surround bus formats (with fewer channels than the “parent bus”).

The child bus that you created will be available for routing in the Mixer. It is a part of the parent surround bus, which means that it has no separate channel strip.

Although child busses are probably most useful in output busses, you can also create child busses within a surround input bus – for example if you want to record a stereo channel pair (e.g. front left-right) in the surround bus to a separate stereo track.

Presets

On the Inputs and Outputs tabs you will find a Presets menu. Here you can find three different types of presets:

- A number of standard bus configurations.
- Automatically created presets tailored to your specific hardware configuration.

On startup, Nuendo analyzes the physical inputs and outputs provided by your audio hardware and creates a number of hardware-dependent presets with the following possible configurations:

- one stereo bus
- various combinations of stereo and mono busses
- a number of mono busses
- one 5.1 bus (if you have 6 or more inputs)
- various combinations of 5.1 and stereo busses (if you have 6 or more inputs)
- various combinations of 5.1 and mono busses (if you have 6 or more inputs)
- Your own user presets that you can save by clicking the Store button (“+” symbol). You can then select the stored configuration directly from the Presets pop-up menu at any time. To remove a stored preset, select it and click the Delete button (“-” symbol).

Setting up group and FX channels

The Group/FX tab in the VST Connections window shows all group channels and FX channels in your project. You can create new group or FX channels by clicking the corresponding Add button. This is the same as creating group channel tracks or FX channel tracks in the Project window (see [“Using group channels”](#) on [page 170](#) and the chapter [“Audio effects”](#) on [page 195](#)).

However, the VST Connections window also allows you to create child busses for group and FX channels. This is useful if you have group or FX channels in surround format and want to route stereo channels to specific channel pairs in these.

Creating a child bus for a group or FX channel in surround format is similar to creating a child bus for input and output busses, see [“Adding child busses”](#) on [page 31](#).

About monitoring


The VST Connections window allows you to set up the busses used for monitoring, activate/deactivate the Control Room and open the Control Room Mixer. For details about using the Control Room and setting up the Studio tab in the VST Connections window, see the chapter [“Control Room”](#) on [page 179](#).

When the Control Room is disabled on the Studio tab of the VST Connections window, the Main Mix bus is used for monitoring. In this case you can adjust the monitoring level in the regular Project Mixer, see the chapter [“The Mixer”](#) on [page 151](#).

External instruments/effects

Nuendo supports the integration of external effect devices and external instruments, e.g. hardware synthesizers, into the sequencer signal flow.

You can use the External Instruments tab and the External FX tab in the VST Connections window to define the necessary send and return ports and access the instruments/effects through the VST Instruments window.

 External instruments and effects are indicated by an “x” icon in the list next to their names in the respective pop-up menus.

Requirements

- To use external effects, you need audio hardware with multiple inputs and outputs. To use external instruments, a MIDI interface must be connected to your computer.

An external effect will require at least one input and one output (or input/output pairs for stereo effects) in addition to the input/output ports you use for recording and monitoring.


- As always, audio hardware with low-latency drivers is a good thing to have.

Nuendo will compensate for the input/output latency and ensure that the audio processed through external effects is not shifted in time.

Connecting the external effect/instrument

To set up an external effect or instrument, proceed as follows:

1. Connect an unused output pair on your audio hardware to the input pair on your external hardware device. In this example, we assume that the hardware device has stereo inputs and outputs.
2. Connect an unused input pair on your audio hardware to the output pair on your hardware device.

 Please note that it is possible to select input/output ports for external effects/instruments that are already used (i.e. that have been selected as inputs/outputs in the VST Connections window). If you select a used port for an external effect/instrument, the existing port assignment will be broken. Note that you will not get a warning message!

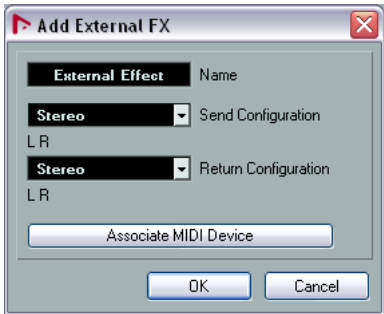
Once the external device is connected to the audio hardware of your computer, you have to set up the input/output busses in Nuendo.

Setting up external effects

To set up an external effect in the VST Connections window, proceed as follows:

1. Open the External FX tab and click the “Add External FX” button.

A dialog opens.



2. Enter a name for the external effect and specify the send and return configurations.

Depending on the type of effect, you can specify mono, stereo or surround configurations.

- You also need a MIDI device that corresponds with the external effect. You can then click the “Associate MIDI Device” button to connect the two.

You can use the MIDI Device Manager to create a new MIDI device for the effect. Note that delay compensation will only be applied for the effect when you use MIDI devices. For information about the MIDI Device Manager and user device panels see the chapter “Using MIDI devices” on [page 380](#).

3. Click OK.

This adds a new external FX bus.

4. Click in the Device Port column for the “left” and “right” ports of the Send Bus and select the outputs on your audio hardware that you want to use.

5. Click in the Device Port column for the “left” and “right” ports of the Return Bus and select the inputs on your audio hardware that you want to use.

6. If you like, make additional settings for the bus.

These are found in the columns to the right. Note that you can adjust these while actually using the external effect – which may be easier as you can hear the result.

The following options are available:

Setting	Description
Delay	If your hardware effect device has an inherent delay (latency), enter this value here, as it allows Nuendo to compensate for that delay during playback. You can also let the delay value be determined by the program: Right-click the Delay column for the effect and select “Check User Delay”. Note that you do not have to take the latency of the audio hardware into account – this is handled automatically by the program.
Send Gain	Allows you to adjust the level of the signal being sent to the external effect.
Return Gain	Allows you to adjust the level of the signal coming in from the external effect. Note however that excessive output levels from an external effect device may cause clipping in the audio hardware. The Return Gain setting cannot be used to compensate for this – you have to lower the output level on the effect device instead.
MIDI Device	When you click in this column, a pop-up menu opens where you can disconnect the effect from the associated MIDI device, select a MIDI device, create a new device or open the MIDI Device Manager to edit the MIDI device. When Studio Manager 2 is installed, you may also select an OPT editor to access your external effect.
Used	Whenever you insert an external effect into an audio track, this column shows a checkmark (“x”) to indicate that the effect is being used.

⇒ Note that external device ports are exclusive, see “Connecting the external effect/instrument” on [page 32](#).

How to use the external effect

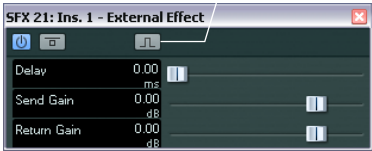
If you now click an insert effect slot for any channel, you will find the new external FX bus listed on the “External Plug-ins” submenu.

When you select it, the following happens:

- The external FX bus is loaded into the effect slot just like a regular effect plug-in.
- The audio signal from the channel is sent to the outputs on the audio hardware, through your external effect device and back to the program via the inputs on the audio hardware.
- A parameter window opens, showing the Delay, Send Gain and Return Gain settings for the external FX bus. You can adjust these as necessary while playing back. The parameter window also provides the “Measure Effect’s Loop Delay for Delay Compensation” button. This is the same function as the “Check User Delay” option in the VST Connections window. It provides Nuendo with a Delay value to be used for delay com-

pensation. When you have defined a MIDI device for the effect, the corresponding Device window will be opened. When Studio Manager 2 is installed, and you have set up a corresponding OPT editor, this OPT editor is displayed.

Measure Effect's Loop Delay button



The default parameter window for an external effect

Like any effect, you can use the external FX bus as an insert effect or as a send effect (an insert effect on an FX channel track). You can deactivate or bypass the external effect with the usual controls.

Setting up external instruments

To set up an external instrument in the VST Connections window, proceed as follows:

- 1. Open the External Instrument tab and click the “Add External Instrument” button. A dialog opens.



- 2. Enter a name for the external instrument and specify the number of required mono and/or stereo returns. Depending on the type of instrument, a specific number of mono and/or stereo return channels is required.
 - You also need a MIDI device that corresponds with the external instrument. You can then click the “Associate MIDI Device” button to connect the two. You can use the MIDI Device Manager to create a new MIDI device. For information about the MIDI Device Manager and user device panels, see the chapter “Using MIDI devices” on page 380.
- 3. Click OK. This adds a new external instrument bus.

- 4. Click in the Device Port column for the “left” and “right” ports of the Return Bus and select the inputs on your audio hardware to which you connected the external instrument.

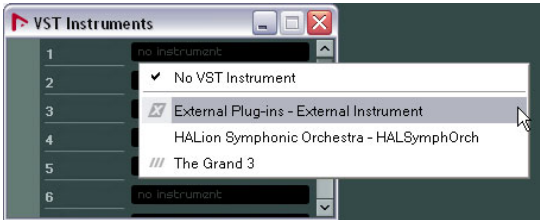
- 5. If you like, make additional settings for the bus. These are found in the columns to the right. Note that you can adjust these while actually using the external instrument – which may be easier as you can hear the result. The following options are available:

Setting	Description
Delay	If your hardware device has an inherent delay (latency), enter this value here. This allows Nuendo to compensate for that delay during playback. Note that you do not have to take the latency of the audio hardware into account – this is handled automatically by the program.
Return Gain	Allows you to adjust the level of the signal coming in from the external instrument. Note however that excessive output levels from an external device may cause clipping in the audio hardware. The Return Gain setting cannot be used to compensate for this – you have to lower the output level on the device instead.
MIDI Device	When you click in this column, a pop-up menu opens where you can disconnect the instrument from the associated MIDI device, select a MIDI device, create a new device or open the MIDI Device Manager to edit the MIDI device. When Studio Manager 2 is installed, you may also select an OPT editor to access your external instrument.
Used	Whenever you insert the external instrument into a VST instrument slot, this column shows a checkmark (“x”) to indicate that the instrument is being used.

⇒ Note that external device ports are exclusive, see “Connecting the external effect/instrument” on page 32.

How to use the external instrument

Once you have set up the external instrument in the VST Connections window, you can use it as a VST instrument. Open the VST Instruments window and click on an empty instrument slot. On the Instrument pop-up menu, your external instrument is listed on the External Plug-ins submenu:



When you select the external instrument in the VST Instruments window, the following happens:

- A parameter window for the external device opens automatically. This may either be the Device window, allowing you to create a generic device panel, an OPT editor window or a default editor. For information about the Device window, the MIDI Device Manager and User device panels, see the chapter [“Using MIDI devices”](#) on [page 380](#).

⚠ To send MIDI notes to the external instrument, open the Output Routing pop-up menu in the Inspector for the corresponding MIDI track and select the MIDI device to which the external instrument is connected. This ensures use of delay compensation. The instrument will now play any MIDI notes it receives from this track and return them to Nuendo through the return channel(s) you have set up.

The external instrument will behave like any other VST instrument in Nuendo.

About the Favorites buttons

In the VST Connections window, both the External FX tab and the External Instruments tab feature a Favorites button.



Favorites are device configurations that you can recall at any time, like a library of external devices that are not constantly connected to your computer. They also allow you to save different configurations for the same device, e.g. a multi-effect board or an effect that provides both a mono and a stereo mode.

To save a device configuration as a favorite, proceed as follows:

- When you have added a new device in the VST Connections window, select it in the Bus Name column and click the Favorites button.

A context menu is displayed showing an option to add the selected effect or instrument to the Favorites.

- You can recall the stored configuration at any time by clicking the Favorites button and selecting the device name from the context menu.

About the “plug-in could not be found” message

When you open a project that uses an external effect/instrument, you may get a “plug-in could not be found” message. This will happen when you remove an external device from the VST Connections window although it is used in a saved project, or when transferring a project to another computer on which the external device is not defined. You may also see this message when opening a project created with an earlier version of Nuendo.

In the VST Connections window, the broken connection to the external device is indicated by an icon in the Bus Name column.

To reestablish the broken connection to the external device, simply right-click the entry for the device in the Bus Name column and select “Connect External Effect”. The icon is removed, and you can use the external device within your project as before.

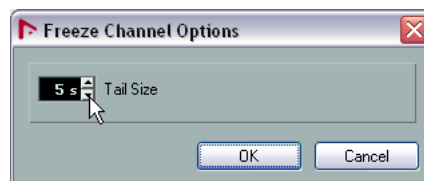
⚠ Note that busses set up for external effects or external instruments are saved “globally”, i.e. for your particular computer setup.

Freezing external effects/instruments

Just as when working with regular VST instruments and effects, you can also choose to freeze external effects and instruments. The general procedure is described in detail in the chapters [“Audio effects”](#) on [page 195](#) and [“VST instruments and instrument tracks”](#) on [page 215](#).

⚠ Note that you have to perform Freeze in realtime. Otherwise external effects will not be taken into account.

When freezing external instruments or effects, you can adjust the corresponding tail value in the Freeze Channel Options dialog:



- Use the arrow buttons next to the Tail Size value field to set the desired Tail length, i.e. the range after the part boundary is also to be included in the freeze. You can also click directly in the value field and enter the desired value manually (the maximum value being 60s).
- When the Tail Size is set to 0s (default), the freezing will only take into account the data within the Part boundaries.

Editing operations

On the different tabs of the VST Connections window the corresponding busses or channels are shown in a table containing a tree view with expandable entries. After you have set up all the required busses for a project it might be necessary to edit the names and/or change port assignments. Nuendo provides a number of features to make such tasks easier.

Expanding and collapsing entries

- Bus entries can be expanded or collapsed to show or hide the corresponding speaker channels or sub-busses by clicking the “+” or “-” sign in front of the corresponding list entry.
- To expand or collapse all entries on a tab at the same time, use the “+ All” button or the “- All” button (respectively) above the tree view.

Determining how many busses a device port is connected to

To give you an idea how many busses a given port is already connected to, the busses are shown in square brackets on the Device Port pop-up menu, to the right of the port name.

Up to three bus assignments can be displayed in this way. If more connections have been made, this is indicated by a number at the far right.

Therefore if you see the following:

Adat 1 [Stereo1] [Stereo2] [Stereo3] (+2)...

this means that the Adat 1 port is already assigned to three stereo busses plus two additional busses.

Identifying exclusive port assignments

In some cases (i.e. for certain channel types such as Studio channels) the port assignment is exclusive. Once a port has been assigned to such a bus or channel, it should not be assigned to another bus since the assignment to the first bus is broken in that case.

To help you identify such exclusive port assignments and avoid accidental reassignment, the corresponding ports are marked in red on the Device Port pop-up menu.

Selecting/Deselecting multiple entries

- Using the key commands [Ctrl]/[Command]-[A] (Select All) and [Shift]-[Ctrl]/[Command]-[A] (Select None) you can select or deselect all entries in the Bus Name column. Note that for this to work the table on the current tab needs to have the focus. This can be achieved by clicking anywhere on the background of the table.
 - By holding [Shift] when selecting entries in the Bus Name column, you can select multiple entries at the same time. This is useful for automatic renaming or changing the port assignments globally, see below.
- ⇒ If you select a sub entry (e.g. a speaker channel in a bus) the parent entry is automatically selected as well.

Selecting entries by typing the name

In the Bus Name list you can jump to an entry by typing the first letter of the bus name on the keyboard.

⚠ This will only work if the table has the focus. To do this, simply select any list entry.

Navigating the Bus Name list using the [Tab] key

By pressing the [Tab] key you can jump to the next entry in the Bus Name list, allowing you to rename your busses quickly. Similarly, by pressing [Shift]-[Tab] you can return to the previous list entry.

Automatically renaming selected busses

You can rename all the selected busses at once using incrementing numbers or letters from the alphabet.

- To use incrementing numbers, select the busses that you want to rename and enter a new name for one of the busses, followed by a number.

For example, if you have eight inputs that you want to be named "In 1, In 2, ..., In 8", you select all the busses and enter the name "In 1" for the first bus. All other busses are renamed automatically.

- To use letters from the alphabet, you proceed as with numbers, but enter a capital letter instead of a number. For example, if you have three FX channels that you want to be named "FX A, FX B, and FX C", you select all the channels and enter the name "FX A" for the first. All other channels are renamed automatically. The last letter to be used is Z. If you have more selected entries than there are letters available, the remaining entries will be skipped.

⚠ When using letters instead of numbers it is important to note that these must be preceded by a space. If you leave out the space before the letter or if you do enter neither a letter nor a number, only the first selected entry is renamed.

⇒ You do not have to begin renaming with the topmost selected entry. The renaming will start from the bus where you edit the name, will go down the list to the bottom and then continue from the top until all selected busses have been renamed.

Changing the port assignment for a single bus

To change the port assignment for a single bus, you proceed as when you added it: Make sure that the channels are visible and click in the Device Port column to select ports.

Changing the port assignment for multiple busses

To change the port assignment (or the output routing in case of groups/FX channels) for multiple entries in the Bus Name column at the same time, you need to select the corresponding busses first.

- To assign different ports to the selected busses, press [Shift], open the Device Port pop-up menu for the first selected entry (i.e. the topmost bus) and select a device port. All subsequent busses are automatically connected to the next available port.

⚠ Exclusive ports (e.g. ports already assigned to Control Room channels) will be skipped!

- To assign the same ports to all selected busses, press [Shift]-[Alt]/[Option], open the Device Port pop-up menu for the first selected entry (i.e. the topmost bus) and select a device port.

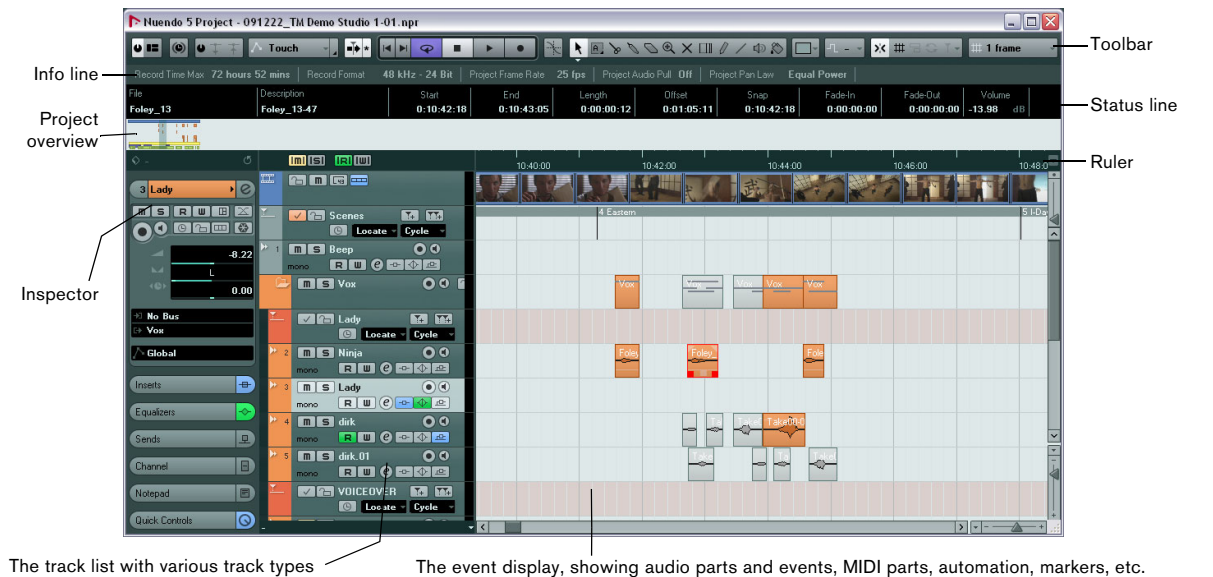
⇒ Using this procedure, you can also set all selected busses or channels to Not Connected.

Removing busses

To remove a bus you do not need, select it in the list, right-click and select Remove Bus from the pop-up menu, or press [Backspace].

Window Overview

The Project window is the main window in Nuendo. This provides you with an overview of the project, allowing you to navigate and perform large scale editing. Each project has one Project window.



About tracks

The Project window is divided vertically into tracks, with a timeline running horizontally from left to right. The following track types are available:

Track type	Description
Audio	For recording and playing back audio events and audio parts. Each audio track has a corresponding audio channel in the Mixer. An audio track can have any number of automation tracks for automating Mixer channel parameters, effect settings, etc.
Folder	Folder tracks function as containers for other tracks, making it easier to organize and manage the track structure. They also allow you to edit several tracks at the same time, see "Folder tracks" on page 65.

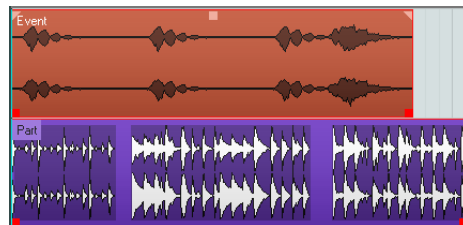
Track type	Description
FX Channel	FX channel tracks are used for adding send effects. Each FX channel can contain up to eight effect processors – by routing effect sends from an audio channel to an FX channel, you send audio from the audio channel to the effect(s) on the FX channel. Each FX channel has a corresponding channel strip in the Mixer – in essence an effect return channel, see the chapter "Audio effects" on page 195. All FX channel tracks are automatically placed in a special FX channel folder in the track list, for easy management. An FX channel can also have any number of automation tracks for automating Mixer channel parameters, effect settings, etc.
Group Channel	By routing several audio channels to a Group channel, you can submit them, apply the same effects to them, etc. (see "Using group channels" on page 170). A Group channel track contains no events as such, but displays settings and automation curves for the corresponding Group channel. Each Group channel track has a corresponding channel strip in the Mixer. In the Project window, Group channels are organized as tracks in a special Group Tracks folder.

Track type	Description
Instrument	This allows you to create a track for a dedicated instrument, making VST instrument handling easier and more intuitive. Instrument tracks have a corresponding channel strip in the Mixer. Each instrument track can have any number of automation tracks in the Project window. However, Volume and Pan are automated from within the Mixer. It is possible to edit instrument tracks directly in the Project window, using the Edit In-Place function (see “The In-Place Editor” on page 422). For more information on instrument tracks, see the chapter “VST instruments and instrument tracks” on page 215 .
MIDI	For recording and playing back MIDI parts. Each MIDI track has a corresponding MIDI channel strip in the Mixer. It is possible to edit MIDI tracks directly in the Project window, using the Edit In-Place function (see “The In-Place Editor” on page 422). A MIDI track can have any number of automation tracks for automating Mixer channel parameters, insert and send effect settings, etc.
Marker	Marker tracks display markers which can be moved and renamed directly in the Project window (see the chapter “Using markers” on page 136).
Arranger	The arranger track is used for arranging your project, by marking out sections in the project and determining in which order they are to be played back. See the chapter “The arranger track” on page 122 for details.
Ruler	Ruler tracks contain additional rulers, displaying the timeline from left to right. You can use any number of ruler tracks, each with a different display format if you wish. See “The ruler” on page 47 for more information about the ruler and the display formats.
Signature	Time signature events can be added and edited on the signature track, or in the Tempo Track Editor. A project can have only one signature track. See the chapter “Editing tempo and signature” on page 452 for details.
Tempo	You can create tempo changes within a project using the tempo track. A project can have only one tempo track. See the chapter “Editing tempo and signature” on page 452 for details.
Transpose	The transpose track allows you to set global key changes. A project can have only one transpose track, see the chapter “The transpose functions” on page 129 .
Video	For playing back video events. A project can have two video tracks.

About parts and events

The tracks in the Project window contain parts and/or events. Events are the basic building blocks in Nuendo. Different event types are handled differently in the Project window:

- Video events and automation events (curve points) are always viewed and rearranged directly in the Project window.
- MIDI events can always be found in MIDI parts, which are containers for one or more MIDI events. MIDI parts are rearranged and manipulated in the Project window. To edit the individual MIDI events in a part, you have to open the part in a MIDI editor (see [“The MIDI editors”](#) on [page 403](#)).
- Audio events can be displayed and edited directly in the Project window, but you can also work with audio parts containing several events. This is useful if you have a number of events which you want to treat as one unit in the project. Audio parts also contain information about the time position in the project.



An audio event and an audio part

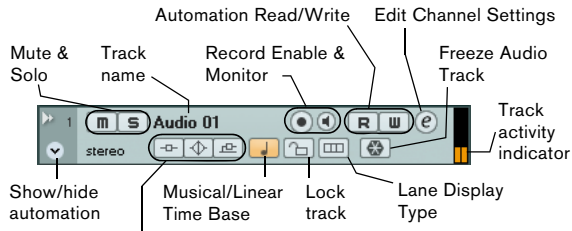
Getting on-the-fly info with the Arrow tool

If the “Select Tool: Show Extra Info” option is activated in the Preferences dialog (Editing–Tools page), a tooltip will be shown for the Arrow tool, displaying information depending on where you point it. For example, in the Project window event display, the tool will show the current pointer position and the name of the track and event you are pointing at.

The track list

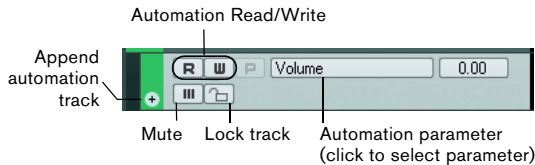
The track list displays all the tracks used in a project. It contains name fields and settings for the tracks. Different track types have different controls in the track list. To see all the controls you may have to resize the track in the track list (see [“Resizing tracks in the track list”](#) on [page 59](#)).

- The track list area for an audio track:

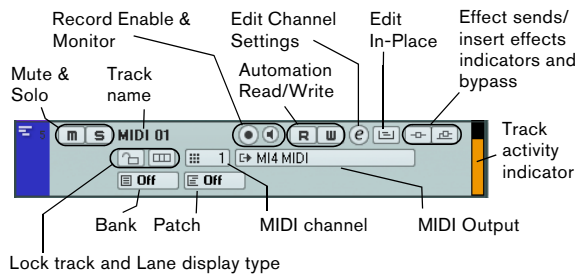


Indicate whether effect sends, EQ, or insert effects are activated for the track. Click to bypass.

- The track list area for an automation track (opened by clicking the Show/Hide Automation button on a track):



- The track list area for a MIDI track:



- You can decide for each track type which controls are shown in the track list – see [“Customizing track controls”](#) on [page 573](#).

The Inspector

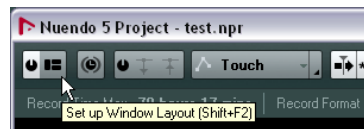
The area to the left of the track list is called the Inspector. This shows additional controls and parameters for the track you have selected in the track list. If several tracks are selected, the Inspector shows the setting for the first (topmost) selected track.

Opening the Inspector

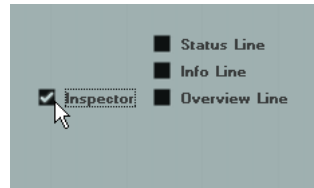
To show the Inspector, proceed as follows:

1. On the toolbar, click the “Set up Window Layout” button.

A transparent pane appears, covering the Project window.



2. In the gray area in the middle, activate the Inspector option.

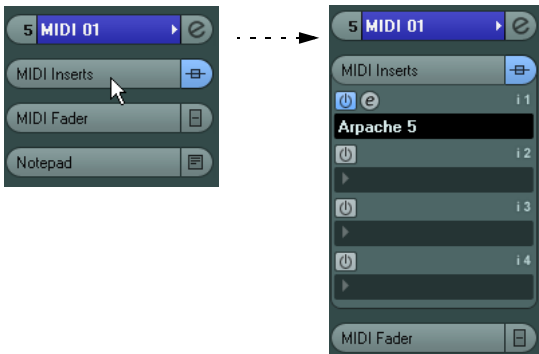


Inspector handling

For most track classes, the Inspector is divided into a number of sections, each containing different controls for the track. Which sections are available in the Inspector depends on the selected track.

- You can hide or show sections by clicking on their names.

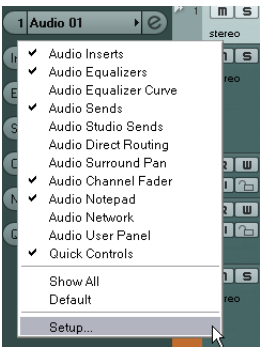
Clicking the name for a hidden section brings it into view and hides the other sections. [Ctrl]/[Command]-clicking the section name allows you to hide or show a section without affecting the other sections. [Alt]/[Option]-clicking a section name shows or hides all sections in the Inspector.



- You can also use key commands to show different Inspector sections. These are set up in the Key Commands dialog, see [“Setting up key commands”](#) on [page 581](#).

⇒ Hiding a section does not affect its functionality. For example, if you have set up a track parameter or activated an effect, your settings will still be active even if you hide the respective Inspector section.

Not all Inspector tabs are shown by default. You can show/hide Inspector sections by right-clicking on an Inspector tab and activating/deactivating the desired options on the Inspector Setup context menu.



⇒ Make sure that you right-click on an Inspector tab and not on the empty area below the Inspector, as this will open the Quick context menu instead.

Inspector sections

The Inspector contains the controls that can be found on the track list, plus some additional buttons and parameters. In the table below, these additional settings and the different sections are listed. Which sections are available for which track type is described in the following sections.

Parameter	Description
Auto Fades Settings button	Opens a dialog in which you can make separate Auto Fade settings for the audio track, see “Making Auto Fade settings for individual tracks” on page 121 .
Edit Channel Settings	Opens the Channel Settings window for the track, allowing you to view and adjust effect and EQ settings, etc., see “Using Channel Settings” on page 163 .
Volume	Use this to adjust the level for the track. Changing this setting will move the track’s fader in the Mixer window, and vice versa. See “Setting volume in the Mixer” on page 157 to learn more about setting levels.
Pan	Use this to adjust the panning of the track. As with the Volume setting, this corresponds to the Pan setting in the Mixer.
Delay	This adjusts the playback timing of the audio track. Positive values delay the playback while negative values cause the track to play earlier. The values are set in milliseconds.
Input Routing	This lets you specify the input bus or MIDI input for the track. See “Setting up busses” on page 28 for information about input busses.
Output Routing	Here you decide to which output the track is routed. For audio tracks you select an output bus (see “Setting up busses” on page 28) or Group channel, for MIDI tracks you select a MIDI output and for instrument tracks, you select the instrument to which it is routed.

Parameter	Description
Inserts section	Allows you to add insert effects to the track, see the chapters “Audio effects” on page 195 and “MIDI realtime parameters and effects” on page 372. The Edit button at the top of the section opens the control panels for the added insert effects.
Equalizers section	Lets you adjust the EQs for the track. You can have up to four bands of EQ for each track, see “Making EQ settings” on page 164. The Edit button at the top of the section opens the Channel Settings window for the track.
Equalizer Curve section	Lets you adjust the EQs for the track graphically, by clicking and dragging points in a curve display.
Sends section	Allows you to route an audio track to one or several FX channels (up to eight), see the chapter “Audio effects” on page 195. The Edit button above a slot opens the control panel for the first effect in each FX channel. For MIDI tracks, this is where you assign MIDI send effects. Clicking the Edit button above a slot opens the control panel for the corresponding MIDI effect.
Studio Sends	The Studio Sends are used to route cue mixes to Control Room Studios. For a detailed description of Studios and Studio Sends, see the chapter “Control Room” on page 179.
Surround Pan	When the SurroundPanner is used for a track, this is also available in the Inspector. For further information, see “Using the SurroundPanner V5” on page 230.
Channel section	Shows a duplicate of the corresponding Mixer channel strip. The channel overview strip to the left lets you activate and deactivate insert effects, EQs and sends.
Notepad section	This is a standard text notepad, allowing you to jot down notes about the track. If you have entered any notes about a track, the icon next to the “Notepad” heading will light up to indicate this. Moving the pointer over the icon will display the Notepad text in a tooltip.
Network section	This contains controls related to the Network functions of the program. For further information, see the chapter “Networking” on page 482.
User Panel	Here you can display device panels, e.g. for external MIDI devices, audio track panels or VST insert effect panels. For information on how to create or import MIDI device and user panels, see the separate PDF document “MIDI Devices”.
Quick Controls	Here you can configure quick controls, e.g. to use remote devices, see the chapter “Track Quick Controls” on page 362.

Audio tracks

For audio tracks, all settings and sections listed above are available.

Instrument tracks

As explained in the chapter [“VST instruments and instrument tracks”](#) on page 215, the Inspector for an instrument track shows some of the sections from VST instrument channels and MIDI tracks.

MIDI tracks

When a MIDI track is selected, the Inspector contains a number of additional sections and parameters, affecting the MIDI events in realtime (e.g. on playback). Which sections are available for MIDI tracks is described in the chapter [“MIDI realtime parameters and effects”](#) on page 372.

Arranger track

For the arranger track, the Inspector displays the lists of available arranger chains and arranger events. See the chapter [“The arranger track”](#) on page 122 for details.

Folder tracks

When a folder track is selected, the Inspector shows the folder and its underlying tracks, much like a folder structure in the Windows Explorer or Mac OS X Finder.

⇒ You can click one of the tracks shown under the folder in the Inspector to have the Inspector show the settings for that track. This way, you do not have to “open” a folder track to make settings for tracks within it.

FX channel tracks

When an FX channel track is selected, the following controls and sections are available:

- Edit button
- Volume control
- Pan control
- Output Routing pop-up menu
- Inserts section
- Equalizers section
- Equalizer Curve section
- Sends section
- Studio Sends section
- Surround Pan section
- Channel section
- Notepad section

FX channel tracks are automatically placed in a special folder, for easier management. When this folder track is selected, the Inspector shows the folder and the FX channels it contains. You can click one of the FX channels shown in the folder to have the Inspector show the settings for that FX channel – this way you do not have to “open” a folder track to access the settings for the FX channels in it.

Group channel tracks

When a group channel track is selected, the following controls and sections are available:

- Edit button
- Volume control
- Pan control
- Output Routing pop-up menu
- Inserts section
- Equalizers section
- Equalizer Curve section
- Sends section
- Studio Sends section
- Surround Pan section
- Channel section
- Notepad section

Just like FX channel tracks, all group channel tracks are placed in a separate folder – when this is selected, the Inspector shows the folder and the group channels it contains. You can click one of the group channels shown in the folder to have the Inspector show the settings for that group channel – this way, you do not have to “open” a folder track to access the settings for the group channels in it.

Marker tracks

When the marker track is selected, the Inspector shows the marker list. For more information, see the chapter “Using markers” on page 136.

Ruler tracks

For ruler tracks, the Inspector is not used.

Transpose track

When the transpose track is selected, the following controls and sections are available:

- Mute button
- Keep Transpose in Octave range
- Toggle Timebase button
- Lock button
- Notepad section
- Network section

The transpose track controls are described in detail in the chapter “The transpose functions” on page 129.

Signature track and tempo track

For the signature track and the tempo track, the Inspector displays a list of all time signature events or tempo events. See the chapter “Editing tempo and signature” on page 452 for details.

Video tracks

When a video track is selected, the Inspector contains a lock button for locking the track (see the section “Locking events” on page 74), a Mute button for interrupting video playback and two settings for video thumbnails: Show Frame Numbers and Show Thumbnails (see the section “Video files in the Project window” on page 524).

Video tracks make use of the Notepad and Network Inspector tabs.

The toolbar

The toolbar contains tools and shortcuts for opening other windows and various project settings and functions.



You can show/hide most of the toolbar elements (except the Activate Project and “Set up Window Layout” buttons) by activating/deactivating the corresponding options on the context menu. The following options are available:

Option	Description
Constrain Delay Compensation	This is described in the section “Constrain Delay Compensation” on page 225.
Media & Mixer Windows	When this is activated, buttons for opening or closing the MediaBay, the Pool, the Mixer, and the Control Room Mixer are displayed on the toolbar.

Option	Description
Performance Meter	When this is activated, meters for ASIO time usage and hard disk transfer load are displayed, see “About the VST Performance window” on page 25 .
Network Controls	When this is activated, buttons used when working in a network are displayed. For details, see the chapter “Networking” on page 482 .
Automation Mode	When this is activated, the automation mode and a button to open/close the Automation panel are displayed on the toolbar. For details, see the chapter “Automation” on page 239 .
Auto-Scroll	When this is activated, buttons for the options “Auto-Scroll” and “Suspend Auto-Scroll when Editing” are displayed, see “Auto-Scroll” on page 50 .
Locators	When this is activated, the left and right locator positions are displayed on the toolbar.
Transport Buttons	When this is activated, the transport buttons from the Transport panel are also displayed on the toolbar.
Arranger Controls	When this is activated, the controls used when working with the arranger track are displayed, see the chapter “The arranger track” on page 122 .
Time Display	When this is activated, the Transport panel’s time display is displayed on the toolbar.
Markers	When this is activated, the Transport panel’s marker buttons are displayed on the toolbar.
Snap to Zero Crossing	This is described in the section “Snap to Zero Crossing” on page 49 .
Tool Buttons	When this is activated, tool buttons for editing in the Project window are displayed on the toolbar.
Color menu	This shows/hides the color pop-up menu, see “Applying colors in the Project window” on page 577 .
Nudge Palette	Activate this to display the nudge buttons. These buttons can be used to nudge events or parts in the Project window or for trimming (see “Moving events” on page 69 and “Resizing events” on page 72).
Project Root Key	Activate this to display the Project Root Key. For details, see the chapter “The transpose functions” on page 129 .
Snap/Quantize	These options are described in the sections “The Snap function” on page 48 and “The quantizing functions” on page 392 .

⇒ How to further set up the toolbar is described in the section [“Using the Setup options”](#) on [page 572](#).

The status line

The status line is displayed below the toolbar in the Project window.



It displays the following information:

Option	Description
Record Time Max	This displays the time you have left for recording, depending on your project settings and the available hard disk space. Click in this field to display the remaining record time in a separate window.
Record Format	This displays the sample rate and the bit resolution used for recording.
Project Frame Rate	This displays the frame rate used in the project.
Project Audio Pull	This displays the audio pull setting used in the project. For further information about audio pulls, see “The Project Setup dialog” on page 57 .
Project Pan Law	This displays the current Pan Law setting.

⇒ Clicking on any of the fields except the Record Time Max display opens the Project Setup dialog, where you can adjust the settings (see [“The Project Setup dialog”](#) on [page 57](#)).

⚠ Nuendo permits different sample rate settings for a project and the audio hardware. However, as a result the audio files in a project will not play back in their original pitch. If the “Record Format” field is highlighted in a different color, there is a sample rate mismatch and you should check the settings in the Project Setup dialog. The same applies to the Project Audio Pull field.

- To show or hide the status line, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Status Line option.

The info line

The info line is displayed below the status line in the Project window.

File	Description	Start	End
Event-01	Event-01	0:00:00:01	0:00:12:19

The info line shows information about the currently selected event or part in the Project window. You can edit almost all values on the info line using regular value editing. Length and position values are displayed in the format currently selected for the ruler (see [“The ruler”](#) on [page 47](#)).

- To show or hide the info line, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Info Line option.

The following elements can be selected for display and editing on the info line:

- Audio events
- Audio parts
- MIDI parts
- Video events
- Markers
- Automation curve points
- Transpose events
- Arranger events

When several elements are selected

▪ If you have selected several elements, the info line shows information about the first item in the selection. The values are displayed in color to indicate that several elements are selected.

▪ If you edit a value on the info line, the value change is applied to all selected elements, relatively to the current values.

If you have selected two audio events, the first being one bar long and the second two bars, the info line shows the length of the first event (one bar). If you now change this value to 3 bars in the info line, the other event will be resized by the same amount – and will thus be 4 bars long.

▪ To enter absolute values for the selected elements, press [Ctrl]/[Command] while modifying the value on the info line. In the example above, both events would be resized to 3 bars.

[Ctrl]/[Command] is the default modifier key for this – you can change this in the Preferences dialog (Editing–Tool Modifiers page, in the Info Line category).

Editing transpose and velocity for MIDI parts

When one or several MIDI parts are selected, the info line contains Transpose and Velocity fields.

▪ Adjusting the Transpose field transposes the selected parts in semitone steps.

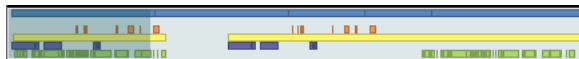
Note that this transposition does not change the actual notes in the part – it is just a “play parameter”, affecting the notes on playback. The transposition you specify for a part on the info line is added to the transposition set for the whole track. For more information on transposing, see the chapter [“The transpose functions”](#) on [page 129](#).

▪ Adjusting the Velocity field shifts the velocity for the selected parts – the value you specify is added to the velocities of the notes in the parts.

Again, this velocity shift only affects the notes on playback, and again, the value you specify is added to the Vel.Shift. value set for the whole MIDI track in the Inspector.

The overview line

The overview line is displayed below the info line in the Project window. In the overview line, events and parts on all tracks are displayed as boxes.



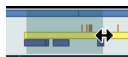
▪ To show/hide the overview line, proceed as for the info line (see above), but activate the Overview Line option instead.

You can use the overview line to zoom in or out, and for navigating to other sections of the project. This is done by moving and resizing the track view rectangle in the overview line:



▪ The track view rectangle indicates the section of the project currently displayed in the event display.

▪ You zoom in or out horizontally by resizing the rectangle. Resize it by dragging the edges of the rectangle.



▪ You can drag the track view rectangle to view other sections of the project.

This can also be done by clicking anywhere in the upper part of the overview – the track view rectangle will be moved to where you clicked.

The ruler



The ruler at the top of shows the timeline. Initially, the Project window ruler uses the display format specified in the Project Setup dialog (see “The Project Setup dialog” on page 57), as do all other rulers and position displays in the project. However, you can select an independent display format for the ruler by clicking the arrow button to the right of it and selecting an option from the pop-up menu (you can also bring up this pop-up menu by right-clicking anywhere in the ruler).

Option	Positions and lengths displayed as
Bars+Beats	Bars, beats, sixteenth notes and ticks. By default there are 120 ticks per sixteenth note but you can adjust this with the “MIDI Display Resolution” setting in the Preferences dialog (MIDI page).
Seconds	Hours, minutes, seconds and milliseconds.
Timecode	This format displays hours, minutes, seconds, and frames. The number of frames per second (fps) is set in the Project Setup dialog with the Frame Rate pop-up menu (see “The Project Setup dialog” on page 57).
Feet+Frames 16mm	Feet and frames, with 40 frames per foot.
Feet+Frames 35mm	Feet, frames and 1/4 frames, with 16 frames per foot.
Samples	Samples.
fps (User)	Hours, minutes, seconds and frames, with a user-definable number of frames per second. You set the desired number of fps in the Preferences dialog (Transport page).
Time Linear	When this is selected, the ruler will be linear relative to time. This means that if there are tempo changes on the tempo track, the distance between the bars will vary in Bars+Beats mode.
Bars+Beats Linear	When this is selected, the ruler will be linear relative to the meter position – bars and beats. This means that if there are tempo changes on the tempo track, there still will be the same distance between bars in Bars+Beats mode. If the ruler is set to a time-based mode, the distance between seconds will vary depending on the tempo changes.

- The selection you make here affects the ruler, the info line and tooltip position values (which appear when you drag an event in the Project window). You can also select independent formats for other rulers and position displays.

- To set the display format globally (for all windows), use the primary display format pop-up on the Transport panel, or hold down [Ctrl]/[Command] and select a display format in any ruler.

- If you use the “Timecode” or “User” options and the “Show Timecode Subframes” option is activated in the Preferences dialog (Transport page), the frames will also display subframes. There are 80 subframes per frame.

- For the “Feet+Frames” settings, there is an option in the Preferences dialog (Transport page) called “Feet’n’Frames Count from Project Start”.

When this is activated, time displays and rulers in Feet+Frames format will always start with 0’00 at the beginning of the project – regardless of any Start offset settings in the Project Setup dialog.

Using multiple rulers – ruler tracks

As described above, the Nuendo Project window contains a main ruler at the top of the event display, displaying the timeline from left to right.

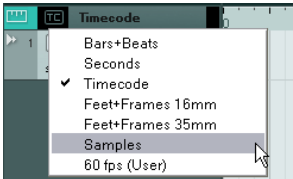
If needed, you can have several rulers in the Project window, by adding ruler tracks to the project. Each ruler track contains an additional ruler.

- To add a ruler track, open the “Add Track” submenu from the Project menu and select “Ruler”.
- A ruler track showing an additional ruler is added to the track list.



You can add any number of ruler tracks to a project, and position them as needed by dragging them up or down in the track list. Each of the rulers can show a separate display format.

- To select a display format for a ruler track, click on its name in the track list and select an option from the pop-up menu.



Note that ruler tracks are completely independent from the main event display ruler, as well as rulers and position displays in other windows. This means that:

- Each ruler track in a project can have its own display format.
- Ruler tracks are not affected by the display format setting in the Project Setup dialog (see [“The Project Setup dialog”](#) on [page 57](#)).
- Ruler tracks are not affected if you set the display format globally with the primary time display in the Transport panel.

⇒ Ruler tracks are affected by the “Show Timecode Subframes” option in the Preferences dialog (Transport page, see above).

The Snap function

The Snap function helps you to find exact positions when editing in the Project window. It does this by restricting horizontal movement and positioning to certain positions. Operations affected by Snap include moving, copying, drawing, sizing, splitting, range selection, etc.

- You turn Snap on or off by clicking the Snap icon on the toolbar.

Snap activated.



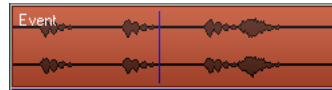
When you are moving audio events with Snap activated, it is not necessarily the beginning of the event that is used as Snap position reference. Instead, each audio event has a snap point, which you can set to a relevant position in the audio (such as a downbeat, etc.).

The snap point is preferably set in the Sample Editor since it allows for a higher degree of precision (see [“Adjusting the snap point”](#) on [page 288](#)). You can however also set the snap point directly in the Project window, in the following way:

1. Select an event.
2. Place the project cursor at the desired position within the selected audio event.

3. Pull down the Audio menu and select “Snap Point To Cursor”.

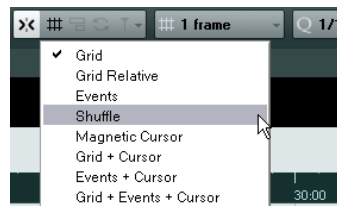
The snap point is set at the cursor position.



The snap point for an event is displayed as a blue line in the Project window.

The Snap Type pop-up menu

To determine how the Snap function works, open the Snap Type pop-up menu and select one of the available options.



In the Snap Type pop-up menu the following options are available:

Grid

If you select this Snap type, the Snap positions are set with the Grid Type pop-up menu. The options depend on the display format selected for the ruler. For example, if the ruler is set to show bars and beats, the grid can be set to bars, beats, or the quantize value set with the Quantize type pop-up menu. If a time or frame-based ruler format is selected, the Grid Type pop-up menu contains time or frame-based grid options, etc.



When Seconds is selected as ruler format, the Grid Type pop-up menu contains time-based grid options.

Grid Relative

If you select this Snap type, events and parts will not be “magnetic” to the grid. Rather, the grid determines the step size for moving the events. This means that a moved event will keep its original position relative to the grid.

For example, if an event starts at the position 3.04.01 (one beat before bar 4), Snap is set to Grid Relative and the Grid Type pop-up menu is set to “Bar”, you can move the event in steps of one bar – to the positions 4.04.01, 5.04.01 and so on. The event will keep its relative position to the grid, i.e. stay one beat before the bar lines.

- This only applies when dragging existing events or parts – when you create new events or parts this snap type works like “Grid”.

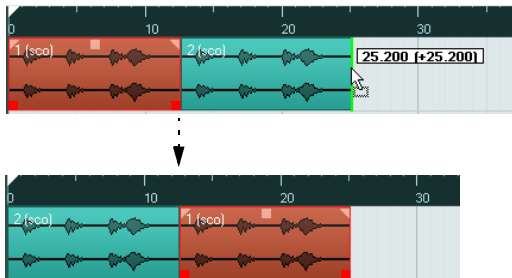
Events

This grid type makes the start and end positions of other events and parts become “magnetic”. This means that if you drag an event to a position near the start or end of another event, it is automatically aligned with the start or end of the other event. For audio events, the position of the snap point is also magnetic (see [“Adjusting the snap point”](#) on [page 288](#)).

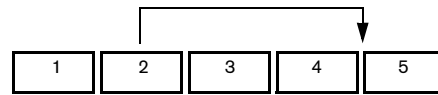
- Note that this includes marker events on the marker track. This allows you to snap events to marker positions, and vice versa.

Shuffle

Shuffle is useful when you want to change the order of adjacent events. If you have two adjacent events and drag the first one to the right, past the second event, the two events will change places.



The same principle works when changing the order of more than two events:



Dragging event 2 past event 4...



...changes the order of events 2, 3 and 4.

Magnetic Cursor

This grid type lets the project cursor become “magnetic”. Dragging an event near the cursor causes the event to be aligned with the cursor position.

Grid + Cursor

This is a combination of “Grid” and “Magnetic Cursor”.

Events + Cursor

This is a combination of “Events” and “Magnetic Cursor”.

Events + Grid + Cursor

This is a combination of “Events”, “Grid” and “Magnetic Cursor”.

Snap to Zero Crossing

When this option is activated on the toolbar or in the Preferences dialog (Editing–Audio page), splitting and sizing of audio events is done at zero crossings (positions in the audio where the amplitude is zero). This helps you avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

Auto-Scroll



“Auto-Scroll” and “Suspend Auto-Scroll when Editing” are activated

When the Auto-Scroll option is activated, the waveform display will scroll during playback, keeping the project cursor visible in the window. You can find the Auto-Scroll button on the toolbars of the Project window and all editors.

- If the “Stationary Cursors” option is activated in the Preferences dialog (Transport page), the project cursor will be positioned in the middle of the screen (if possible).

Suspending Auto-Scroll

When editing parts or events during playback with Auto-Scroll enabled, you may suddenly “lose sight” of the edited material as the display follows the project cursor.

If you do not want the Project window display to change when editing during playback, you can activate the “Suspend Auto-Scroll when Editing” button. You will find this button right next to the Auto-Scroll button. When this option is enabled, auto-scrolling is suspended as soon as you click anywhere in the event display during playback.

Proceed as follows:

1. Open a project that contains audio or MIDI parts/events.
2. Enable both the “Auto-Scroll” and the “Suspend Auto-Scroll when Editing” buttons.
3. Start playback.
4. Edit an audio or MIDI part/event of your project (e.g. click and drag it to a different location on its track).
The Auto-Scroll button turns orange.

Auto-Scrolling is now suspended, i.e. when the project cursor moves to the right edge of the Project window, the display will not follow to keep the cursor visible.

As soon as playback stops or when you click the Auto-Scroll button again, Nuendo will return to the normal Auto-Scroll behavior.

Creating new projects

The New Project command on the File menu allows you to create a new project, either as an empty project or based on a template:

1. Select “New Project...” from the File menu.

The templates list is displayed. By default, this list is empty. How to create templates is described in the section “[Save as Template](#)” on [page 53](#).

2. Select a template (or “Empty”) and click OK.

A file dialog opens, allowing you to specify a location for the project folder. This will contain all files related to the project.

3. Select an existing folder or create a new folder and click OK.

A new, untitled project is created. If you selected a template, the new project will be based on this template and include the corresponding tracks, events, and settings.

Opening projects

The “Open...” command on the File menu is used for opening saved project files. Project files created with Nuendo (file extension “.npr”), Cubase (file extension “.cpr”) and Sequel (extension “.steinberg-project”) can be opened. Note that program-specific settings which cannot be applied in Nuendo will be ignored.

1. Select “Open...” from the File menu.

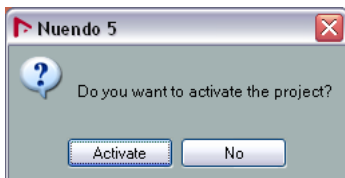
A file dialog opens, allowing you to select a project.

2. Click Open to open the selected project.

- Several projects can be open at the same time.

This is useful if you want to copy parts or entire sections from one project to another.

3. If there is already an open project, you will be asked if you want to activate the new project.

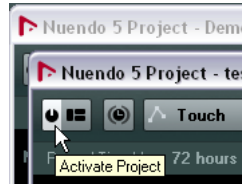


- Click No to open the project inactive.

This significantly reduces load times, especially for large projects.

- Click Activate to open and activate the new project.

The active project is indicated by the lit Activate Project button in the upper left corner of the Project window. To activate a different project, simply click its Activate Project button.



- You can also open project files by selecting an entry from the “Recent Projects” submenu of the File menu. This submenu lists the projects you have recently worked with, with the most recent at the top of the list.

- You can also set Nuendo to automatically open a project when you launch the program (see “[Startup Options](#)” on [page 56](#)).

- You can drag projects from the MediaBay into the Nuendo application window (not into an existing Project window) to open them.

About the “Missing Ports” dialog

If you open a Nuendo project created on a different system (other audio hardware), the program tries to find matching audio inputs and outputs for the i/o busses (this is one of the reasons why you should use descriptive, generic names for your input and output ports – see “[Preparations](#)” on [page 29](#)).

If the program cannot resolve all audio/MIDI inputs and outputs used in the project, a Missing Ports dialog will open. This allows you to manually re-route any ports specified in the project to ports available in your system.

Closing projects

The Close command on the File menu closes the active window. If a Project window is active, selecting this closes the corresponding project.

- If the project contains unsaved changes, you are asked whether you want to save it before closing.

If you select “Don’t Save” and have recorded or created new audio files since saving, you will be asked if you want to delete or keep these.

Saving projects

Save and Save As

The commands Save and Save As allow you to save the active project as a project file (file extension “.npr”). The Save command stores the project under its current name and location, while Save As allows you to rename and/or relocate the file. If a project has not been saved yet or if it has not been changed since it was last saved, only Save As is available.

⚠ Generally, we recommend that you save project files in their project folders, to keep the projects as manageable as possible.

A word about file extensions

Under Windows, file types are indicated by three letter file name extensions (such as *.npr for Nuendo project files).

Under Mac OS X, it is not necessary to use file name extensions, since the file types are stored internally in the files. However, if you want your Nuendo projects to be compatible with both platforms, make sure that the “Use File Extension in File Dialog” option is activated in the Preferences dialog (General page). When this is activated, the proper file name extension is automatically added when you save a file.

Save New Version

This function is only available as a key command, by default [Ctrl]/[Command]-[Alt]/[Option]-[S]. When you use this function, an identical, new project file is being created and activated.

The new file will get the same name as the original project, but with an incremental number attached. For example, if your project is called “My Project”, you will get new versions called “My Project-01”, “My Project-02”, and so on.

Save New Version is useful if you are experimenting with edits and arrangements and want to be able to go back to a previous version at any time. The newest versions are always listed on the Recent Projects submenu of the File menu for instant access.

Save as Template

This function allows you to save the current project as a template. When you create a new project, the available templates are listed, allowing you to base the new project on a template.

Proceed as follows:

1. Set up a project.
2. Select “Save As Template...” from the File menu and save the project template under the desired name.

▪ Templates can contain clips and events just like regular projects.

If this is not what you want, make sure to remove all clips from the Pool before you save the project as a template.

Templates are always stored in the Templates folder, see [“Where are the settings stored?”](#) on [page 579](#).

Setting up a default template

If you always want the same default project to open when you launch Nuendo, you can save a default template. Proceed as follows:

1. Set up a project.
2. Select “Save As Template...” from the File menu and save the project template with the name “default”.
3. Open the Preferences dialog and select the General page.
4. Open the “On Startup” pop-up menu and select “Open ‘Default’ Template”.

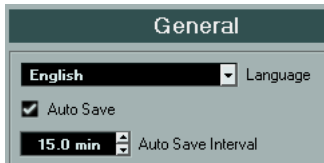
The next time you launch Nuendo, the default template will automatically be opened. For details on the other Startup options, see [“Startup Options”](#) on [page 56](#).

Reverting to the last saved version

If you select “Revert” from the File menu, you will be asked whether you really want to revert to the last saved version of the project. If you click “Revert”, all changes you have made since saving will be discarded.

If you have recorded or created new audio files since saving, you will be asked whether you want to delete or keep these.

Auto Save



If you activate the Auto Save option in the Preferences dialog (General page), Nuendo will automatically save backup copies of all open projects with unsaved changes.

These backup copies are named "<project name>-xx.bak", where xx is an incremental number. Unsaved projects are backed up in a similar way as "UntitledX-xx.bak", with X being the incremental number for unsaved projects. All backup files are saved in the project folder.

- Use the "Auto Save Interval" setting to specify the time intervals in which a backup copy will be created.
- Use the "Maximum Backup Files" option to specify how many backup files will be created with the Auto Save function.

When the maximum number of backup files is reached, the existing files will be overwritten (starting with the oldest file).

⇒ With this option only the project files themselves will be backed up. If you want to include the files from the Pool and save your project in a different location, you need to use the "Back up Project" function.

The Archive and Backup functions

Prepare Archive

The "Prepare Archive" function verifies that every clip referenced in the project is located in the same folder, and takes actions if that is not the case:

- Any files that are located outside the current project folder will be copied into it.

Please note that audio files residing within the project folder are not copied to the audio folder. Therefore, you have to copy them there manually before backing up the audio folder or save them separately during backup, see below.

- If any processing has been applied, you will be asked whether you want to Freeze Edits.

If you do this, you do not have to archive the Edits folder. Everything belonging to the project will be contained in the project file and the Audio folder.

Once you have performed a Prepare Archive operation, you can use the "Back Up Project" function to create a backup of the project file, containing copies of all necessary media files (with the exception of VST Sound content, see below).

It is not necessary to archive the Images folder, since these images can be recreated by Nuendo. You may also find a file with the extension ".csh" in the project folder. This contains image information for edited clips and other data that can be recreated, so it can safely be deleted.

⚠ Video clips are always referenced and not stored in the project folder.

Back up Project

This function is very useful if you want to create a backup copy of a project for your archive. It can also be used to prepare projects for delivery so that they only contain the necessary work data (while leaving the original project untouched). When you back up a project, all media files (except those coming from VST Sound archives) can be included as a copy.

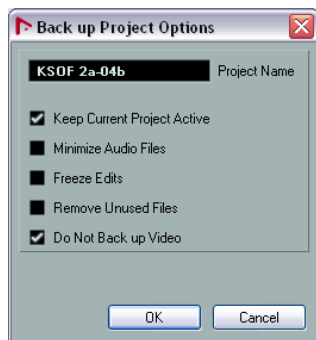
⚠ VST Sound content provided by Steinberg is copy-protected and will not be included in the backup project. If you want to use a backup copy of a project using such data on a different computer, make sure that the corresponding content is also available on that computer.

1. Select “Back up Project...” from the File menu.

A file dialog opens in which you can choose an existing empty folder or create a new folder to save the project.

2. Click OK.

The “Back up Project Options” dialog opens.



This dialog contains the following options:

Option	Description
Project Name	Enter a project name if you want to change it from the default (the current name of the project).
Keep Current Project Active	When this option is activated, the current project will still be the active project after clicking OK. If you wish to switch to the new backup project instead, deactivate this option.
Minimize Audio Files	If this is activated, only the audio file portions that are actually used in the project will be included. This can significantly reduce the size of the project folder (if you are using small sections of large files), but it also means you cannot use other portions of the audio files if you continue working with the project in its new folder.
Freeze Edits	This will perform a Freeze Edits operation, making all processing and applied effects permanent to each clip in the Pool, see “Freeze Edits” on page 277 .
Remove Unused Files	When this is activated, only files in the Pool that are actually used in the project will be stored in the new folder.
Do Not Back up Video	When this is activated, any video clips on the video track or in the Pool of the current project will not be included in the backup project.

3. Make the desired settings.

4. Click OK.

A copy of the project is saved in the new folder. The original project is not affected.

Cleanup

The Cleanup function on the File menu helps you to save hard disk space by locating and – if you like – deleting unused audio files in the project folders on your disk.

1. Select “Cleanup...” from the File menu.

If there are any open projects, an alert shows. Clicking “Close” closes all open projects and brings up the dialog “Cleanup Nuendo Project Folders”.

2. To restrict the Cleanup function to a certain folder, click the “Search Folder” button and select the folder.

The default setting is that the Cleanup function is applied to all folders on all hard disks. Only select a specific folder if you are certain it does not contain audio files used in other projects (outside the folder), see below. You can reset the function to search all folders by opening the “Search Folder” dialog again and clicking “Cancel”.

3. Click the Start button.

Nuendo will now scan the selected folder (or all hard disks) for Nuendo project folders and check for audio and image files (in the Audio, Edits and Images subfolders) that are not used by any project. The found files are listed in the dialog.

4. When the scan is complete, you can select files by clicking in the list.
Use [Ctrl]/[Command]-click to select several files, and [Shift]-click to select a range of files. You can also click the Select All button to select all files in the list.

In the following situations, the Cleanup function will list files that are not unused:

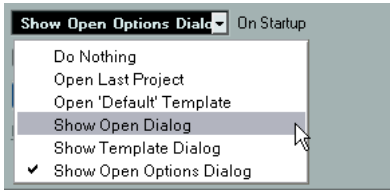
- If you have moved or renamed files or folders (without updating the project files to use the new paths), there is no way for Nuendo to know that these files are used in a project.
- If you perform the Cleanup function on a folder in which there are audio files belonging to other projects (outside the folder), these files will be considered “unused”.
- Also, make sure that you do not delete any files used in other applications, or files that you generally want to keep!

However, you can always safely delete image files since these can be reconstructed by the program, if necessary.

5. Delete any files you do not want to keep by selecting them and clicking Delete.
6. Close the dialog by clicking the Close button.

Startup Options

The “On Startup” pop-up menu in the Preferences dialog (General page) allows you to specify what happens when you launch Nuendo.



The following options are available:

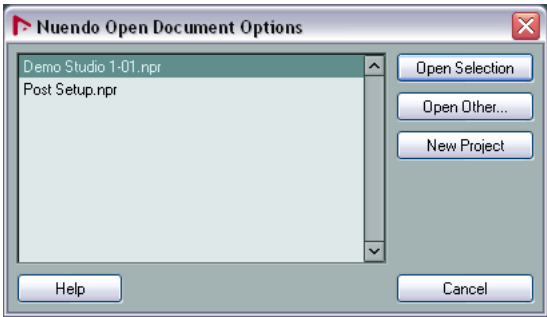
Option	Description
Do Nothing	Nuendo launches without opening a project.
Open Last Project	The last saved project is opened on launch.
Open 'Default' Template	The default template is opened, see “Setting up a default template” on page 53 .
Show Open Options Dialog	The Open dialog opens on launch, allowing you to manually locate and open the desired project.
Show Template Dialog	The Template dialog opens on launch, allowing you to create a new project from one of the templates.
Show Open Options Dialog	The Open Document Options dialog opens on launch, see below. It allows you to make a different choice each time you launch Nuendo.

Nuendo Open Document Options dialog

The Open Document Options dialog lists your recently used projects. It will open in two cases:

- If you launch Nuendo with the “Show Open Options Dialog” option selected on the “On Startup” pop-up menu in the Preferences dialog (General page).

- If you hold down [Ctrl]/[Command] while launching Nuendo.

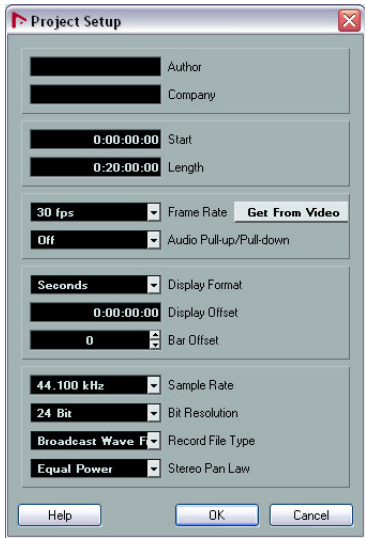


- To open a project, select it and click the “Open Selection” button.
- To open another project not listed here, click the “Open Other...” button. A file dialog opens that allows you to look for the desired file on your disk.
- To create a new project, click the “New Project” button.

The Project Setup dialog

General settings for the project are made in the Project Setup dialog. This is opened by selecting “Project Setup...” from the Project menu.

⇒ If the “Run Setup on Create New Project” option is activated in the Preferences dialog (General page), the Project Setup dialog will open automatically when you create a new project.



The following settings are available in the Project Setup dialog:

Setting	Description
Author	Here you can add a name that will be written as the project author into the iXML chunk when exporting audio files with the corresponding option activated (see “AIFF files” on page 478). The default setting for this can be set in the Preferences dialog (General–Personalization page).
Company	Here you can add a name that will be written as the company name into the iXML chunk when exporting audio files with the corresponding option activated (see “AIFF files” on page 478). The default setting for this can be set in the Preferences dialog (General–Personalization page).

Setting	Description
Start	The start time of the project. Allows you to have the project start at another time than zero. Also used for setting the sync start position when synchronizing Nuendo to external devices (see the chapter “Synchronization” on page 496). The format of this value is always in timecode. When you change this setting you will be asked whether you want to keep the project content at its timecode positions. “Yes” means that all events will stay at their original timecode positions – i.e. they will be moved in relation to the start of the project. “No” means that all events keep their position relative to the project start. See also the note on Feet+Frames in the section “The ruler” on page 47.
Length	The length of the project. Nuendo is capable of having longer lengths than 24 hours because the timecode includes a “day” field. This can be handy when creating projects that use “time of day” timecode and cross the 24 hour mark. The maximum project length is 10 days.
Frame Rate	This setting determines both the timecode standard and frame rate for the project, see “Timecode standards” on page 498. The frame rate of a video file used in a project should match the frame rate set for a project. The “Get From Video” button allows you to set the project frame rate to the frame rate of an imported video file, see the section “Adopting the video frame rate” on page 523. When synchronizing Nuendo to an external device, make sure that this setting corresponds to the frame rate of any incoming timecode. However, there might be situations where perfect synchronization does not matter to you and you do not want to change the project frame rate. In this case, the frame rate mismatch will be indicated on the Transport panel in the Sync section.
Audio Pull-up/ Pull-down	When working with film transfers, this option is used to synchronize sound and images correctly. The pop-up menu is separated into two parts. In the upper part the pull factors available for your hardware are displayed. The lower part shows pull factors that are not supported by your audio hardware. If you select a non-supported pull factor, it will be highlighted in a different color. Audio pull-up and pull-down is described in detail in the section “Adjusting audio playback speed” on page 531.
Display Format	This is the global display format used for all rulers and position displays in the program, except ruler tracks (see “Ruler tracks” on page 44). However, you can make independent display format selections for the individual rulers and displays if you like. For descriptions of the different display format options, see “The ruler” on page 47.
Display Offset	Offsets the time positions displayed in the ruler, etc., allowing you to compensate for the Start position setting. Typically, if you synchronize Nuendo to an external source starting at a frame other than zero, you set the Start position to this value. However, if you still want the display in Nuendo to start at zero, set the Display Offset to the same value.

Setting	Description
Bar Offset	This works just like “Display Offset” described above, in that it offsets the time positions in the ruler by a number of bars, allowing you to compensate for the Start position setting. The difference is that Bar Offset is only used when the “Bars+Beats” display format is selected (see “The ruler” on page 47).
Sample Rate	The sample rate at which Nuendo records and plays audio. The order of the menu items depends on the sample rates available for your audio hardware. Supported settings are displayed in the upper part of the menu, non-supported settings are displayed in the lower part. Regarding the sample rate, there are two possible scenarios: Either your audio hardware generates the audio clock signals itself or it is clocked externally, i.e. receives signals from an external sample clock source. If the sample rate is generated internally, the following applies: When you select a sample rate non-supported by your audio hardware (from the lower part of the menu), it is highlighted in a different color and the corresponding tooltip shows a warning. In this case you must set a different sample rate to make your audio files play back properly. When you specify a project sample rate that your audio hardware supports but which is different from the current audio hardware sample rate, and you confirm your settings by clicking OK, the sample rate setting of the audio hardware is automatically changed to the project sample rate. If your audio hardware is clocked externally, ensure that the project sample rate corresponds to the external sample rate. Furthermore, you should “tell” Nuendo that it receives external clock signals in the Device Setup dialog on the page of your audio driver by activating the “Externally Clocked” option. When you now change the project sample rate, it will be highlighted to inform you about a possible sample rate mismatch.
Bit Resolution/Record File Type	When you record audio in Nuendo, the files that are created will be of this resolution and file type, see “Selecting a recording file format” on page 93.
Stereo Pan Law	Decides whether panning uses power compensation or not, see “About the “Stereo Pan Law” setting” on page 162.

⚠ While most Project Setup settings can be changed at any time, you should set the sample rate directly after creating a new project! If you change the sample rate at a later stage, you must convert all audio files in the project to the new sample rate to make them play back properly.

Zoom and view options

Zooming in the Project window is done according to the standard zoom techniques, with the following special notes:

- When you are using the Zoom tool (magnifying glass), the result depends on the “Zoom Tool Standard Mode: Horizontal Zooming Only” option in the Preferences dialog (Editing–Tools page).

If this is activated and you drag a selection rectangle with the Zoom tool, the window will only be zoomed horizontally (track height will not change). If the option is off, the window will be zoomed both horizontally and vertically.

- When using the vertical zoom sliders, the tracks are scaled relatively.

In other words, if you have made any individual track height adjustments (see below), the relative height differences are maintained.

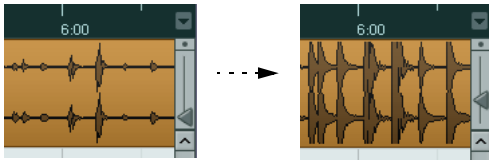
You find the following options are available on the Zoom submenu on the Edit menu:

Option	Description
Zoom In	Zooms in one step, centering on the project cursor.
Zoom Out	Zooms out one step, centering on the project cursor.
Zoom Full	Zooms out so that the whole project is visible. “The whole project” means the timeline from the project start to the length set in the Project Setup dialog (see above).
Zoom to Selection	Zooms in horizontally and vertically so that the current selection fills the screen.
Zoom to Selection (Horiz)	Zooms in horizontally so that the current selection fills the screen.
Zoom to Event	This option is available only in the Sample Editor (see “Zooming” on page 287).
Zoom In Vertically	Zooms in one step vertically.
Zoom Out Vertically	Zooms out one step vertically.
Zoom In Tracks	Zooms in on the selected track(s) one step vertically.
Zoom Out Tracks	Zooms out the selected track(s) one step vertically.
Zoom Selected Tracks	This zooms in vertically on the selected track(s) and minimizes the height of all other tracks.
Undo/Redo Zoom	These options allow you to undo/redo the last zoom operation.

- If the “Zoom while Locating in Time Scale” option is activated in the Preferences dialog (Transport page), you can also zoom by clicking in the ruler and dragging up or down with the mouse button pressed.
Drag up to zoom out; drag down to zoom in.

- You can zoom the contents of parts and events vertically, using the waveform zoom slider in the top right corner of the event display.

This is useful when viewing quiet audio passages.



- ⚠ To get an approximate reading on the level of the audio events by viewing the waveforms, make sure this slider is all the way down. Otherwise, zoomed waveforms may be mistaken for clipped audio.

- If you activate the option Quick Zoom in the Preferences dialog (Editing page), the contents of parts and events will not be continuously redrawn when you zoom manually. Instead, the contents are redrawn once you have stopped changing the zoom – activate this if screen redraws are slow on your system.

Resizing tracks in the track list

- You can change the height of an individual track by clicking on its lower border in the track list and dragging up or down.

To change the height of all tracks simultaneously, hold down [Ctrl]/[Command] and resize one of the tracks in this way. If “Snap Track Heights” is activated on the Track scale pop-up (see below), the track height will change in fixed increments when you resize it.

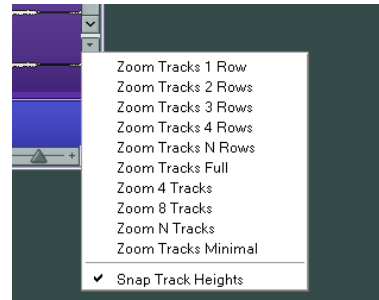
- ⚠ This behavior is different when “Enlarge Selected Track” is activated on the Edit menu (see below).

- You can also change the width of the track list area, by dragging the border between the track list and the event display.
- By default, the controls shown for tracks in the track list will adapt to the track size. This means that when resizing a track’s height or width the controls will be placed where they best “fit in”.

If you prefer to have the controls in fixed positions, you can deactivate the “Wrap Controls” option in the Track Controls settings dialog (see “Customizing track controls” on page 573).

- You can use the Track scale pop-up (opened by clicking the arrow button above the vertical zoom control) to set the number of tracks to view in the current Project window.

The track height will be adjusted to show only the number of tracks specified on the pop-up menu. By selecting “Zoom N Tracks” from the pop-up you can manually set the number of tracks to fit in the current Project window.



- Tracks can also be divided vertically in lanes – see “Editing in Lane Display mode” on page 76.

The Enlarge Selected Track option

When this option is activated on the Edit menu (or in the Preferences dialog, Editing–Project & Mixer page), the selected track is enlarged automatically. This is useful if you are stepping through the tracks in the track list, to check or edit the settings. The tracks will revert to the size they had before when they are deselected. You can adjust the size directly in the track list if the default enlargement factor does not suit you.

While this is the program behavior you will want in most cases, it may be a disadvantage when changing the track height you started out with for one or more tracks (i.e. their “original” height, before “Enlarge Selected Track” was activated). As soon as you try to resize a track, it is selected and automatically enlarged. Instead of turning off “Enlarge Selected Track”, resizing the desired track(s) and the activating “Enlarge Selected Track” again, you can resize a track in the track list without selecting it.

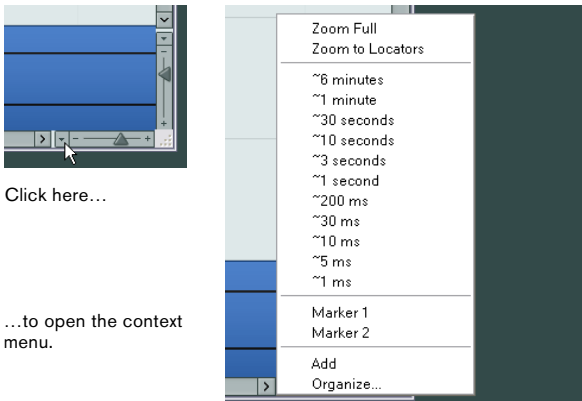
Proceed as follows:

1. Move the mouse pointer over the lower border of the (unselected) track you want to resize. The mouse pointer turns into a divider symbol.

2. Hold down [Alt]/[Option] and drag the lower border of the track until it reaches the desired height.
 Now, when you select this track, (and “Enlarge Selected Track” is activated), it will be enlarged. It will revert to the changed size, when you select a different track.

Zoom presets and cycle markers


The pop-up menu to the left of the horizontal zoom control allows you to select, create and organize zoom presets. These are useful if you want to toggle between different zoom settings (e.g. one where the whole project is displayed in the project window and another with a high zoom factor for detailed editing). With this pop-up menu, you can also zoom in on the area between cycle markers in the project.



The upper part of the menu lists the zoom presets:


- To store the current zoom setting as a preset, select Add from the pop-up menu.
 A dialog opens, allowing you to type in a name for the preset.
- To select and apply a preset, select it from the pop-up menu.
- The “Zoom Full” preset is always available. Selecting this option zooms out so that the whole project is visible. “The whole project” means the timeline from the project start to the length set in the Project Setup dialog (see “The Project Setup dialog” on page 57).
- If you want to delete a preset, select “Organize...” from the pop-up menu.
 In the dialog that opens, select the preset in the list and click the Delete button. The preset is removed from the list.

- If you want to rename a preset, select “Organize...” from the pop-up menu.
 In the dialog that opens, select the desired preset in the list and click the Rename button. A second dialog opens, allowing you to type in a new name for the preset. Click OK to close the dialogs.

 Zoom presets are global for all projects, i.e. they are available in all projects you open or create.

The middle part of the pop-up menu lists any cycle markers you have added to the project:

- If you select a cycle marker from this menu, the event display is zoomed in to encompass the marker area.
- You cannot edit the cycle markers in this pop-up menu. For information on editing markers, see “The Marker window” on page 138.

 Only the cycle markers you create in the current project are available on the menu.

The Zoom history

Nuendo maintains a history of recent zoom stages, allowing you to undo and redo zoom operations. This way you can zoom in several steps and then easily go back to the zoom stage at which you started.

There are two ways to invoke Undo Zoom and Redo Zoom:

- Use the items on the Zoom submenu on the Edit menu. You can also assign key commands for these.
- Double-click with the Zoom tool (magnifying glass) to Undo Zoom.
 Press [Alt]/[Option] and double-click to Redo Zoom.

Adjusting how parts and events are shown

The Preferences on the File menu (the Nuendo menu, under Mac OS X) contains several settings for customizing the display in the Project window.

The Event Display page contains common settings for all track types:

Option	Description
Colorize Event Background	Determines whether the backgrounds or “contents” (waveforms, etc.) of parts and events will be colorized, see “Handling tracks” on page 61.
Show Event Names	Determines whether the names of parts and events are shown in the Project window.

Option	Description
Transparent Events	When this is activated, events and parts will be transparent, showing the waveforms and MIDI events only.
Show Data on Small Track Heights	If this is activated, the contents of events and parts will be shown, even if the height of a track is very small.

The Event Display–Audio page contains settings for audio events:

Option	Description
Interpolate Audio Images	If the option is deactivated, single sample values are drawn as “steps”. If the option is activated they are interpolated to form “curves”.
Outline Waveforms	Determines whether audio waveforms are displayed as solid images or with an outline. This selection affects all waveform images in the Project window, Sample Editor, and Audio Part Editor.
Show Event Volume Curves Always	If this is activated the “volume curves” created with the volume and fade handles are always shown – if not, the curves are only shown for selected events.
Thick Fade Lines	If this option is activated, the fade lines and volume curves are thicker, increasing their visibility.
Show Waveforms	Determines whether audio waveforms are shown at all.
Background Color Modulation	When this is activated, the backgrounds of audio waveforms are displayed in a different way, reflecting the waveform dynamics. This is especially useful to get an overview when working with small track heights.

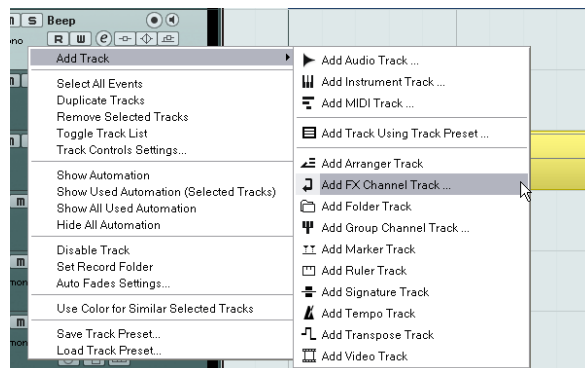
The Event Display–MIDI page contains settings for MIDI parts:

Option	Description
Default Edit Action	Determines which editor is opened when you double-click a MIDI part, or select it and press [Ctrl]/[Command]-[E].
Part Data Mode	Determines if and how events in MIDI parts are shown in the Project window: as score notes, as drum notes (Nuendo Expansion Kit only) or as lines. If “No Data” is selected, events will not be shown at all. Nuendo Expansion Kit only: Note that this setting is overridden for tracks with drum maps if the “Edit as Drums when Drum Map is assigned” option (see below) is activated.
Show Controllers	Governs whether non-note events (controllers, etc.) are shown in MIDI parts in the Project window.
Edit as Drums when Drum Map is assigned (Nuendo Expansion Kit only)	If this is activated, parts on MIDI tracks with drum maps assigned will be shown with drum note symbols in the Project window. Also, the parts will automatically open in the Drum Editor when double-clicked (overriding the Default Edit Action setting above).
Note Name Style	Determines how MIDI note names (pitches) are displayed in editors, etc.

Handling tracks

To add a track to the project, open the “Add Track” submenu from the Project menu and select a track type. The new track is added below the currently selected track in the track list.

- The items on the “Add Track” submenu are also available on the context menu. This is accessed by right-clicking the track list.

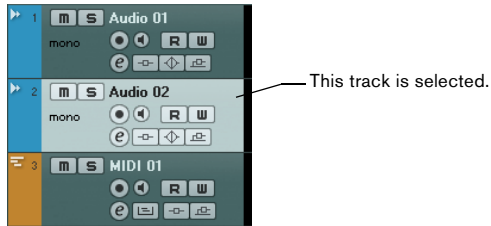


- If you select the Audio, MIDI, Group Channel, or Instrument option from the Add Track submenu, a dialog opens, allowing you to insert several tracks in one go. You just need to enter the desired number of tracks in the Count field.
- For audio and group channel tracks, the channel configuration – mono, stereo or surround configuration – can be set in the Configuration pop-up menu.
- The Choose Track Preset option in the Add Track dialog is described in the chapter “Working with track presets” on page 356.
- In the Preferences dialog (Editing–Project & Mixer page), you can find the “Auto Track Color Mode” option. This offers you several options for automatically assigning colors to tracks that are added to the project.

Once you have created tracks, you can manipulate and rearrange them in various ways:

- To rename a track, double-click in the name field and type in a new name. If you hold down any modifier key when pressing [Return] to close the name field, all events on the track will get the name you entered.

- To select a track, click on it in the track list.
A selected track is indicated by a light gray color in the track list.



- To select several tracks press [Ctrl]/[Command] and click on them. [Shift]-click to select a continuous range of tracks.
- To move a track, click and drag it up or down in the list.
- To duplicate a track, complete with all contents and channel settings, right-click the track list and select "Duplicate tracks" from the context menu, or select "Duplicate tracks" from the Project menu.

The duplicated track will appear below the original track.

- You can select a default color for a track with the Select Colors pop-up menu on the toolbar. The applied color will be used for all events on the track and will also be shown in the Mixer. You can override the default track color for individual events and parts by using the Color tool or the Select Colors pop-up menu. For more information, see ["Applying colors in the Project window"](#) on page 577.

The "Colorize Event Background" option in the Preferences dialog (Event Display page) determines whether the backgrounds or waveforms of events will be colored.

- To remove a track, right-click on it in the track list and select "Remove Selected Tracks" from the context menu. You can also remove multiple selected tracks, by selecting "Remove Selected Tracks" either from the context menu or from the Project menu. Furthermore, you can remove all tracks not containing any events by selecting "Remove Empty Tracks" from the Project menu.

- To change the track height of an individual track, click on its lower border in the track list and drag up or down, see ["Resizing tracks in the track list"](#) on page 59.

⇒ Note that you can also automatically enlarge the selected track, see ["The Enlarge Selected Track option"](#) on page 59.

Disabling audio tracks

Audio tracks can be disabled by selecting "Disable Track" from the track list context menu. Disabling a track is similar to muting it (see ["Muting events"](#) on page 75), since a disabled track will not be played back. However, disabling a track not only "zeroes" the output volume from the track, but actually shuts down all disk activity for it. For more information, see ["About track disable/enable"](#) on page 87.

Track folding

On the Project menu you will find the Track Folding submenu, allowing you to quickly show, hide or invert what is displayed in the Project window event display. This enables you for example to divide the project into several parts (by creating several folder tracks for the different project elements) and showing/hiding their contents by selecting a menu function (or using a key command). You can also fold in automation tracks this way. The following options are available:

- **Toggle Selected Track**

When you select this menu option, the fold state of the selected track is reversed, i.e. if the track was folded in (its elements (subtracks) were hidden), it is now unfolded (all subtracks displayed) and vice versa.

- **Fold Tracks**

Select this menu option to fold in all open folder tracks in the Project window. Please note that the exact behavior of this function depends on the "Deep Track Folding" setting in the Preferences dialog, see below.

- **Unfold Tracks**

Select this menu option to unfold all folder tracks in the Project window. Please note that the exact behavior of this function depends on the "Deep Track Folding" setting in the Preferences dialog, see below.

- **Flip Fold States**

Select this menu option to flip the fold states of the tracks in the Project window. This means that all tracks that were folded in will be unfolded and all unfolded tracks will be folded in, respectively.

⇒ You can assign key commands for these menu options in the Key Commands dialog (Project category).

In the Preferences dialog (Editing—Project & Mixer page), you can find the following option affecting the track folding behavior:

- **Deep Track Folding**

When this is activated, any folding settings you make in the Track Folding submenu of the Project menu also affect the subelements of the tracks, i.e. if you fold in a folder track which contains 10 audio tracks 5 of which have several automation tracks open, all these audio tracks within the folder track will be folded in as well.

Dividing the track list

It is possible to divide the track list into two parts. Both sections will have independent zoom and scroll controls (if needed), but resizing the window vertically will affect the lower section only (if possible). This is useful if you're working with a video track along with multi-track audio for example. This way, you can place the video track in the upper track list, letting you scroll the audio tracks separately in the lower track list, referencing them against the video track.

- To divide the track list, click the "Divide Track List" button in the top right corner of the Project window just below the ruler.



- To revert to a single track list, click the button again.

When the track list is divided into two parts, the following applies:

- If you add tracks from the Add Track submenu of the Project menu, video tracks, marker tracks, and arranger tracks are automatically placed in the upper part of the track list.

If the track list already contains tracks any video, marker, or arranger tracks, these are automatically moved to the upper part when you divide the track list. All other types of tracks are placed in the lower part.

- If you add tracks from the context menu invoked by right-clicking the track list, the tracks are added to the part of the track list in which you click.

- You can move any type of track from the lower track list to the upper and vice versa by right-clicking it in the track list and selecting "Toggle Track List" from the context menu.

- You can resize the upper part by clicking and dragging the divider between the track list sections.



Switching between musical and linear time base

Tracks can be either musical (tempo) or linear (time) based.

- On a track using linear time base, the events will be positioned on specific time positions – changing the playback tempo will not affect the time position of events.
- On a track using musical time base, the positions of events are represented as meter values (bars, beats, 1/16th notes and ticks, with 120 ticks per 1/16th note). If you change the playback tempo, the events will play back at an earlier or later time.

- In the Preferences dialog (Editing page), you can find the "Default Track Time Type" option.

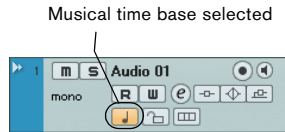
This allows you to specify the default track time type for new tracks (audio, group/FX, MIDI, and marker tracks). When you change this setting, all new tracks will use the selected time type. You can choose between "Musical", "Time Linear" and "Follow Transport Main Display". Selecting "Musical" will cause all added tracks to be set to musical time type.

When you select "Time Linear", all new tracks will use linear time base. The third option uses the primary time format setting on the Transport panel. When this is set to "Bars+Beats", tracks with musical time base will be added. When this is set to any of the other options (Seconds, Timecode, Samples, etc.), all new tracks will use linear time base.

Whether to use musical or linear time base depends on the type of project and recording situation. You can always change this setting individually for each track, by clicking the musical/linear time base button in the Inspector or track list. Musical time base is indicated by a note symbol, while linear time base is indicated by a clock symbol.



Linear time base selected



Musical time base selected

⚠ Internally, events on musical time based tracks use the same high precision for positioning (64 bit floating point values) as linear time based events. However, switching between linear and musical time base results in a very small loss of precision (introduced by the mathematical operations used for scaling values in the two different formats). Therefore you should avoid switching repeatedly between the two modes.

For more information about tempo changes, see the chapter [“Editing tempo and signature”](#) on [page 452](#).

Adding events to a track

There are a number of ways to add events to a track:

- By recording (see [“Basic recording methods”](#) on [page 91](#)).
- By dragging files and dropping them on the track at the desired position.

You can create events by dragging and dropping from the following locations:

- The desktop
- The MediaBay and its related windows (see the chapter [“The MediaBay”](#) on [page 334](#))
- The Pool
- A library (a Pool file that is not attached to a project)
- The “Find media” dialog
- The Project window of another open project
- The Audio Part Editor of any open project

- The Sample Editor – press [Ctrl]/[Command] and drag to create an event of the current selection, or click in the left column of the region list and drag to create an event from a region.



While you drag the clip in the Project window, its position will be indicated by a marker line and a numerical position box (see also [“Using drag and drop”](#) on [page 325](#)).

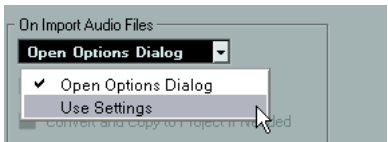
- By selecting [“Audio File...”](#) or [“Video File...”](#) from the Import submenu on the File menu.
This opens a file dialog, allowing you to locate the file you wish to import. When you import a file this way, a clip is created for the file and an event that plays the whole clip is inserted on the selected track, at the position of the project cursor.
You can also import MIDI files by using the Import submenu, but this works in a slightly different way (see [“Exporting and importing standard MIDI files”](#) on [page 560](#)).
- By grabbing audio CD tracks and converting them to audio files (see [“Importing audio CD tracks”](#) on [page 553](#)).
- By importing only the audio portion of a video file and converting it to an audio file (see [“About thumbnail cache files”](#) on [page 524](#)).
- By using Copy and Paste on the Edit menu.
This allows you to copy all kinds of events between projects. You can also copy events within the project, e.g. from the Sample Editor.
- By drawing.
Some types of events (markers and automation events) can be drawn directly into the Project window. For audio and MIDI tracks, you can draw parts (see [“Creating parts”](#) on [page 65](#)).

Audio file import options

When you are importing audio files there are a number of options concerning how the files are treated by Nuendo:

- You can choose to copy the file into the audio folder of the project and have the project make reference to the copied file rather than the original file. This helps you keep your project “self-contained”.
- You can choose to split stereo and multi-channel files into a number of mono files.
- Furthermore, you may want all files in the project to have the same sample rate and sample size (resolution).

The Preferences dialog (Editing–Audio page) contains a setting that lets you decide which options to use. Select one of the following options on the “On Import Audio Files” pop-up menu:



▪ **Open Options Dialog**

An Options dialog opens when you import, allowing you to select whether you want to copy the files to the Audio folder and/or convert them to the project settings. Please note the following:

- When importing a single file of a format other than the project settings, you can specify which properties (sample rate and/or resolution) are changed.
- When importing multiple files at the same time, you can select to convert the imported files automatically if necessary, i.e. if the sample rate is different than the project’s or the resolution is lower than the project setting.

▪ **Use Settings**

No Options dialog will appear when you import. Instead, you can choose to make any of the options below the pop-up menu the standard action(s). Activate any number of the following options to have them performed automatically each time you import audio files:

Option	Description
Copy Files to Working Directory	If files are not already in the project’s audio folder they are copied there before being imported.
Convert and Copy to Project If Needed	If files are not already in the project’s audio folder they are copied there before being imported. Furthermore, if the files have a different sample rate or a lower resolution than the project settings, they are automatically converted.
Split multi-channel files	If you import a multi-channel audio file (including two-channel stereo files), it will be split into a number of mono files – one for each channel – which are placed on separate, automatically created mono tracks. Use the “Use numbers for split file names” option to give the created files the same name as the source file, appended by a number. This avoids confusion if the source file does not contain stereo or surround material, but poly-mono audio.

Creating parts

Parts are containers for MIDI or audio events. If you record MIDI, a MIDI part is automatically created, containing the recorded events. You can also create empty audio or MIDI parts and later add events to them.

There are two ways to do this:

- Draw a part on a MIDI or audio track with the Pencil tool. You can also draw parts by pressing [Alt]/[Option] and using the Arrow tool.
- Double-click with the Arrow tool on a MIDI or audio track, between the left and right locator.

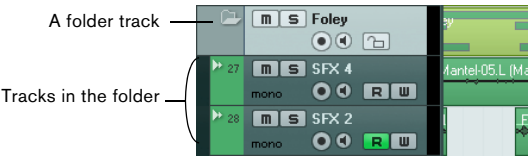


To add events to a MIDI part, you use the tools and functions in a MIDI editor (see “[The Key Editor – Overview](#)” on [page 406](#)). Adding events to audio parts is done in the Audio Part Editor (see “[Window overview](#)” on [page 315](#)) by pasting or by using drag and drop.

- You can also gather existing audio events into a part, by using the “Events to Part” function on the Audio menu. This creates an audio part containing all selected audio events on the same track. To remove the part and make the events appear as independent objects on the track again, select the part and use the “Dissolve Part” function on the Audio menu.

Folder tracks

Moving tracks into a folder is a way to structure and organize tracks in the Project window. By grouping tracks in folder tracks, you can solo and mute them in a quicker and easier way and perform editing on several tracks as one entity. Folder tracks can contain any type of track including other folder tracks.



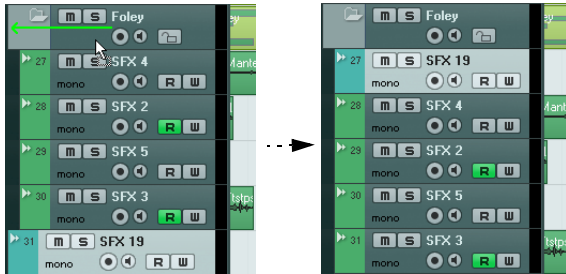
Handling folder tracks

- **Creating a folder track**

On the Project menu open the “Add Track” submenu and select “Folder”, or right-click the track list and select “Add Folder Track” from the context menu.

- **Moving tracks into a folder**

In the track list, click on a track that you want to move into a folder and drag it onto a folder track. An arrow pointing to a folder appears when you drag the track onto the folder track in the list. The track is placed in the folder track, and all parts and events on the track will be represented by a corresponding folder part (see below). You can also create subfolders by moving one folder track into another. For example, you could have a folder containing all the vocals in a project, and each vocal part could have a folder containing all the takes for easier handling, etc.



- **Removing tracks from a folder**

Drag a track out of the folder and release it in the track list to remove it from the folder.

- **Hiding/showing tracks in a folder**

Click on the “Expand/Collapse Folder” button (the folder icon) to hide or show the tracks located in a folder or use the corresponding options in the Track Folding submenu of the Project menu (see [“Track folding”](#) on [page 62](#)). Hidden tracks are played back as usual.

- **Muting and soloing folder tracks**

Click the Mute or Solo button on the folder track to mute or solo all tracks in the folder as one unit.

Working with folder parts

A folder part is a graphic representation of events and parts on the tracks in the folder. Folder parts indicate the position and length of the events and parts, as well as on which track they are (their vertical position). If part colors are used, these are also shown in the folder part.

Audio handling

When you work with audio files, it is crucial to understand how audio is handled in Nuendo:

When you edit or process audio in the Project window, you always work with an audio clip that is automatically created on import or during recording. This audio clip refers to an audio file on the hard disk that itself remains untouched. This means, that audio editing and processing is “non-destructive”, in the sense that you can always undo changes or revert to the original versions.

An **audio clip** does not necessarily refer to just one original audio file! If you apply some processing to a specific section of an audio clip, for example, this will create a new audio file containing only this section. The processing will then be applied to the new audio file only, leaving the original audio file unchanged. Finally, the audio clip is automatically adjusted, so that it refers both to the original file and to the new, processed file. During playback, the program will switch between the original file and the processed file at the correct positions. You will hear this as a single recording, with processing applied to one section only. This feature makes it possible to undo processing at a later stage, and to apply different processing to different audio clips that refer to the same original file.

An **audio event** is the object that you place on a time position in Nuendo. If you make copies of an audio event and move them to different positions in the project, they will still all refer to the same audio clip. Furthermore, each audio event has an Offset value and a Length value. These determine at which positions in the clip the event will start and end, i.e. which section of the audio clip will be played back by the audio event. For example, if you resize the audio event, you will just change its start and/or end position in the audio clip – the clip itself will not be affected.

An **audio region** is a section within a clip with a length value, a start time, and a snap point. Audio regions are shown in the Pool and are best created and edited in the Sample Editor.

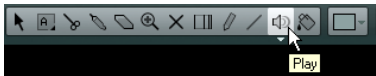
⇒ If you want to use one audio file in different contexts, or if you want to create several loops from one audio file, convert the corresponding regions of the audio clip to events and bounce them into separate audio files. This is necessary since different events that refer to the same clip access the same clip information.

Auditioning audio parts and events

Audio parts and events can be auditioned in the Project window with the Play tool:

⚠ When auditioning, audio will be routed directly to the Control Room, if the Control Room is activated. When the Control Room is deactivated, the audio will be routed to the default output bus, bypassing the audio channel's settings, effects and EQs.

- 1. Select the Play tool.



- 2. Click where you want playback to start, and keep the mouse button pressed.
Only the track on which you click is played back, starting at the click position.
- 3. Release the mouse button to stop playback.

Scrubbing audio

The Scrub tool allows you to locate positions in the audio part or event by playing back, forwards or backwards, at any speed:

- 1. Select the Play tool and click a second time on the icon.

A pop-up menu opens.

- 2. Select "Scrub".



- 3. Click at the desired position of your audio event or part and keep the mouse button pressed.
The project cursor moves to the position where you click. The mouse pointer is not visible anymore.
- 4. Drag to the left or right.
The project cursor moves correspondingly and the audio is played back. The speed and thus the pitch of the playback depend on how fast you move the mouse.

You can adjust the volume of the Scrub function in the Preferences dialog (Transport–Scrub page).

⇒ When scrubbing with the mouse, insert effects are always bypassed.

⇒ It is also possible to "scrub" all audio and video tracks of your project with the Jog wheel and Shuttle Speed control on the Transport panel, see ["The shuttle speed control"](#) on [page 87](#).

Scrubbing can be quite a burden on your system. If playback problems occur, try deactivating the "Use High Quality Scrub Mode" option in the Preferences dialog (Transport–Scrub page). The resampling quality will then be lower, but scrubbing will be less demanding on the processor. This can be useful when scrubbing in large projects.

Editing parts and events

This section describes techniques for editing in the Project window. If not explicitly stated, all descriptions apply to both events and parts, even though we use the term "event" for convenience.

⇒ When you are using the tools for editing, you can in many cases get additional functions by pressing modifier keys (e.g. pressing [Alt]/[Option] and dragging with the Arrow tool creates a copy of the dragged event).

On the following pages, the default modifier keys are described – you can customize these in the Preferences dialog (Editing–Tool Modifiers page), see ["Setting up tool modifier keys"](#) on [page 586](#).

Selecting events

Selecting events is done using any of the following methods:

- Use the Arrow tool.
The standard selection techniques apply.
- Use the Select submenu on the Edit menu.
The options are:

Option	Description
All	Selects all events in the Project window.
None	Deselects all events.
Invert	Inverts the selection – all selected events are deselected and all events that were not selected are selected instead.
In Loop	Selects all events that are partly or wholly between the left and right locator.

Option	Description
From Start to Cursor	Selects all events that begin to the left of the project cursor.
From Cursor to End	Selects all events that end to the right of the project cursor.
Equal Pitch	These are available in the MIDI Editors (see “Selecting notes” on page 412) and the Sample Editor (see “Using the Select menu” on page 289).
Select Controllers in Note Range	This is available in the MIDI Editors (see “Selecting controllers within the note range” on page 412).
All on Selected Tracks	Selects all events on the selected track.
Events under Cursor	Automatically selects all events on the selected track(s) that are “touched” by the project cursor.
Select Event	This is available in the Sample Editor (see “Window overview” on page 283).
Left/Right Selection Side to Cursor	These two functions are only used for range selection editing (see “Creating a selection range” on page 77).

⚠ Note that these functions work differently when the Range Selection tool is selected (see [“Creating a selection range”](#) on page 77).

- Select all events on a track by right-clicking on it in the track list and selecting “Select All Events” from the context menu.

- It is also possible to select ranges, regardless of the event and track boundaries.

This is done using the Range Selection tool (see [“Range editing”](#) on page 77).

- Use the arrow keys on the computer keyboard to select the closest event to the left, right, above, or below. If you press [Shift] and use the arrow keys, the current selection will be kept, allowing you to select several events.

By default, tracks are selected with the up/down arrow keys on the computer keyboard. Therefore using these to select events, too, can be confusing. If you want to use the navigation controls for track selection only (a most vital operation

in both editing and mixing), you can activate the “Use Up/Down Navigation Commands for selecting Tracks only” option in the Preferences dialog (Editing page). The following applies:

- When this option is deactivated and no event/part is selected in the Project window, the up/down arrow keys on the computer keyboard are used to step through the tracks in the track list.
- When this option is deactivated and an event/part is selected in the Project window, the up/down arrow keys still step through the tracks in the track list – but on the currently selected track, the first event/part will automatically be selected as well.
- When this option is activated, the up/down arrow keys are only used to change the track selection – the current event/part selection in the Project window will not be altered.
- If the “Auto Select Events under Cursor” option is activated in the Preferences dialog (Editing page), all events on the selected track(s) that are “touched” by the project cursor are automatically selected.

This can be helpful when rearranging your project, because it allows you to select whole sections (on all tracks) by selecting all tracks and moving the project cursor.

Using the cross hair cursor

Also in the Preferences dialog (Editing–Tools page), you can find the Cross Hair Cursor section. When enabled, a cross hair cursor is displayed when working in the Project window and in the editors, facilitating navigation and editing, especially when arranging large projects. You can set up the colors for the line and the mask of the cross hair cursor, and define its width. The cross hair cursor works as follows:

- When the Selection tool (or one of its subtools) is selected, the cross hair cursor appears when you start moving/copying a part/event, or when using the event trim handles.
- When the Pencil tool, the Scissors tool, or any other tool that makes use of this function is selected, the cross hair cursor appears as soon as you move the mouse over the event display.
- The cross hair cursor is only available for tools where such a function is of any use. The Mute tool, for example, does not use a cross hair cursor, as you have to click directly on an event to mute it.

Moving events

To move events in the Project window, use the following methods:

- Click and drag to a new position.

All selected events are moved, maintaining their relative positions. You can only drag events to tracks of the same type. If Snap is activated, this determines to which positions you can move the events (see [“The Snap function”](#) on [page 48](#)).

Note also that you can restrict movement to be either horizontal or vertical only, by holding down [Ctrl]/[Command] while dragging.

⚠ You will note that there is a slightly delayed response when you move an event by dragging. This helps you avoid accidentally moving events when you click on them in the Project window. You can adjust this delay with the Drag Delay setting in the Preferences dialog (Editing page).

- Select the event and edit the Start position in the info line.
- Use the “Move to” options on the Edit menu.

The following options are available:

Option	Description
Cursor	Moves the selected event to the project cursor position. If there are several selected events on the same track, the first event will start at the cursor, and the following will be lined up end-to-start after the first one.
Origin	Moves the selected events to their original positions, i.e. the positions at which they were originally recorded.
Front/Back	This function does not actually change the position of the events, but moves the selected events to the front or back, respectively. This is useful if you have overlapping events and want to see one that is partially obscured. For audio events, this is an extra important feature, because only the visible sections of events will be played back. Moving an obscured audio event to front (or moving the obscuring event to back) will allow you to hear the whole event on playback (see also “Overlapping events” on page 316). Note that it is also possible to use the “To Front” function on the event context menu for this (although this works in a different way, see “Create Events mode (Preferences)” on page 99).

- Use the Nudge buttons on the toolbar.

These move the selected events to the left or right. The amount of movement depends on the selected display format (see [“The Project Setup dialog”](#) on [page 57](#)) and the value set on the Grid pop-up menu.



⚠ When the Range Selection tool is used, the Nudge buttons move the selection range (see [“Moving and duplicating”](#) on [page 78](#)).

⇒ The Nudge buttons are not visible on the toolbar by default. You can decide which items are visible by right-clicking on the toolbar and activating the corresponding option on the context menu (see [“The setup context menus”](#) on [page 572](#)).

- Use the Up/Down key commands, found in the Nudge category in the Key Commands dialog.

These commands allow you to nudge one or more events (except folder parts) up or down to the nearest track.

⇒ Nudging up/down will not create new tracks: If there is no destination track that matches the track configuration of the nudged event, nothing happens.

There are two exceptions to this behavior:

- If you select events in Lane Display mode, these are moved to the upper or lower lane.
- If you select MIDI events in the In-Place Editor, the MIDI events are nudged up or down.

Aligning events

Nuendo provides shortcuts to quickly align audio events and parts in the project window. You can align to selected parts, events or ranges or to the cursor.

⚠ When the snap point is set, it will be used as a reference when you align events.

To align audio events or parts to selected parts or events, proceed as follows:

1. Select an event or part of any type on any track.

This will be taken as a reference for aligning.

2. Point on the audio event or part you want to move, press one of the modifiers listed in the table below and click.

The mouse pointer will change its shape and the audio event or part will be aligned to the selected part or event.


To align audio events or parts to selection ranges, proceed as follows:

1. Make a selection range on any track.






This will be taken as a reference for aligning.




2. Point on an audio event or part, press one of the modifiers listed in the table below and click.

The mouse pointer will change its shape and the audio event or part will be aligned to the selected range.

 Note that the functions depend on where you point with the mouse.

In both cases, the following modifiers are available:

Modifier	Icon	Description
[Ctrl]/[Command]		This aligns the start of the audio event/part to the start of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] -[Alt]/[Option]		This copies the audio event/part and aligns its start to the start of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command]		This aligns the end of the audio event/part to the start of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] -[Alt]/[Option]		This copies the audio event/part and aligns its end to the start of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] -[Shift]		This aligns the start of the audio event/part to the end of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.

Modifier	Icon	Description
[Ctrl]/[Command] -[Shift] -[Alt]/[Option]		This copies the audio event/part and aligns its start to the end of the selected event, part or range. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] -[Shift]		This aligns the end of the audio event/part to the end of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] -[Shift] -[Alt]/[Option]		This copies the audio event/part and aligns its end to the end of the selected event, part or range. This function is available when you move the mouse on the end of the non-selected event.

You can also align audio events or parts to the project cursor. This is done in the following way:

1. Set the cursor to the position where you want to move the audio part or event.





This will be taken as a reference for aligning.

2. Make sure that nothing is selected in your project.

3. With the arrow tool selected, point on the audio event or part you want to move, press one of the modifiers listed in the table below and click.

The mouse pointer will change its shape and the audio event or part will be aligned to the cursor.

For aligning audio events or parts to the cursor, the following modifiers are available:

Modifier	Icon	Description
[Ctrl]/[Command]		This aligns the start of the audio event/part to the cursor. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command] -[Alt]/[Option]		This copies the audio event/part and aligns its start to the cursor. This function is available when you move the mouse on the beginning of the non-selected event.
[Ctrl]/[Command]		This aligns the end of the audio event/part to the cursor. This function is available when you move the mouse on the end of the non-selected event.
[Ctrl]/[Command] -[Alt]/[Option]		This copies the audio event/part and aligns its end to the cursor. This function is available when you move the mouse on the end of the non-selected event.

⇒ You can change the modifiers in the Preferences dialog (Editing–Tool Modifiers page).

Duplicating events

Events can be duplicated in the following ways:

- Hold down [Alt]/[Option] and drag the event to a new position.

If Snap is activated, this determines to which positions you can copy the events (see “The Snap function” on page 48).

⚠ If you hold down [Ctrl]/[Command] as well, movement direction is restricted to either horizontal or vertical. That means if you drag an event vertically it cannot be moved horizontally at the same time.

- Audio and MIDI parts can also be duplicated by clicking on the part, pressing [Alt]/[Option]-[Shift], and dragging. This creates a shared copy of the part. If you edit the contents of a shared copy, all other shared copies of the same part are automatically edited in the same way.



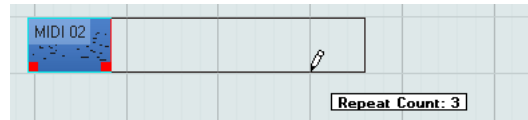
Shared copies are indicated by an icon on the right.

Note:

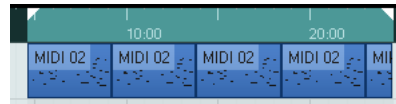
- When you duplicate audio events, the copies are always shared. This means that shared copies of audio events always refer to the same audio clip (see “Audio processing” on page 264).
- You can convert a shared copy to a real copy by selecting “Convert to Real Copy” from the Edit menu. This creates a new version of the clip (that can be edited independently) and adds this to the Pool. Note that no new files are created by this operation – for that you need to use the “Bounce Selection” function from the Audio menu (see “Exporting regions as audio files” on page 330).
- Selecting “Duplicate” from the Edit menu creates a copy of the selected event and places it directly after the original. If several events are selected, all of these are copied “as one unit”, maintaining the relative distance between the events.
- Selecting “Repeat...” from the Edit menu opens a dialog, allowing you to create a number of copies (regular or shared) of the selected event(s). This works just like the Duplicate function, but you can specify the number of copies.

- You can also perform the Repeat function by dragging: Select the event(s) to repeat, press [Alt]/[Option], click the handle in the lower right corner of the last selected event and drag to the right.

The longer to the right you drag, the more copies are created (as shown by the tooltip).



- Selecting “Fill Loop” from the Edit menu creates a number of copies starting at the left locator and ending at the right locator.
- The last copy is automatically shortened to end at the right locator position.



Using Cut, Copy and, Paste

You can cut or copy selected events, and paste them in again, using the functions on the Edit menu.

- When you paste an audio event, it is inserted on the selected track, positioned so that its snap point is aligned with the cursor position.

If the selected track is of the wrong type, the event will be inserted on its original track. See “The Snap function” on page 48 for information about the snap point.

- If you use the “Paste at Origin” function, the event is pasted at its original position (the position from which you cut or copied it).

Using Cut Head and Cut Tail

You can cut everything to the left or right of the cursor or a selected range:

- If you use “Cut Head”, everything to the left of the cursor/selection range will be deleted. No data will be kept in the clipboard.
- If you use “Cut Tail”, everything to the right of the cursor/selection range will be deleted. No data will be kept in the clipboard.

Renaming events

By default, audio events show the name of their clip, but you can enter a separate descriptive name for separate events if you like. This is done by selecting the event and typing in a new name in the “Description” field in the info line, or by using the Rename Object command from the Edit menu.

- You can also give all events on a track the same name as the track by changing the track name, holding down a modifier key and pressing [Return].

See [“Handling tracks”](#) on [page 61](#).

- The Rename Objects command is useful when renaming multiple events at the same time. Select one or more events. Then choose “Rename...” from the Edit menu. You have several options for renaming events automatically using sequential numbers, timestamps and more (see [“Renaming clips or regions in the Pool”](#) on [page 324](#)).

Splitting events

You can split events in the Project window in the following ways:

- Click with the Scissors tool on the event you want to split.

If Snap is activated, this determines the exact split position (see [“The Snap function”](#) on [page 48](#)). You can also split events by pressing [Alt]/[Option] and clicking with the Arrow tool.

- Select “Split at Cursor” from the Edit menu.

This splits the selected events at the position of the project cursor. If no events are selected, all events (on all tracks) that are intersected by the project cursor will be split.

- Select “Split Loop” from the Edit menu.

This splits events on all tracks at the left and right locator positions.

⇒ If you split a MIDI part so that the split position intersects one or several MIDI notes, the result depends on the “Split MIDI Events” option in the Preferences dialog (Editing–MIDI page). If the option is activated, the intersected notes will be split (creating new notes at the beginning of the second part). If it is deactivated, the notes will remain in the first part, but “stick out” after the end of the part.

Gluing events together

You can glue events together using the Glue Tube tool. There are three possibilities:

- Clicking on an event with the Glue Tube tool glues it together with the next event on the track. The events do not have to touch one another.

The result is a part containing the two events, with one exception: If you first split an event and then glue the two sections together again (without moving or editing them first), they become a single event again.

- You can select several events on the same track and click on one of them with the Glue Tube tool.

A single part is created.

- When you hold down [Alt]/[Option] while clicking on an event with the Glue Tube tool, this event will be glued together with all following events on this track.

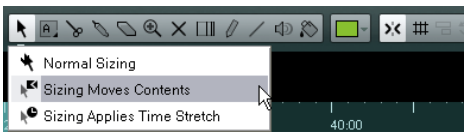
You can change the default key command for this in the Preferences dialog (Editing–Tool Modifiers page).

Resizing events

Resizing events means to move their start or end positions individually. In Nuendo, there are three modes for resizing:

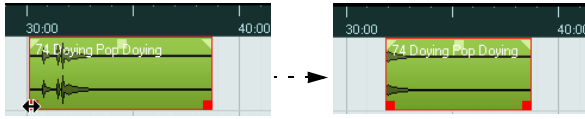
Resizing mode	Description
Normal Sizing	The contents of the event stay fixed, and the start or end point of the event is moved to “reveal” more or less of the contents.
Sizing Moves Contents	The contents follow the moved start or end of the event (see the figure below).
Sizing Applies Time Stretch	The contents will be time stretched to fit the new event length (see the separate section “Resizing events using time stretch” on page 73).

To select one of the resizing modes, select the Arrow tool and then click again on the Arrow tool icon on the toolbar. This opens a pop-up menu from which you can select one of the options.

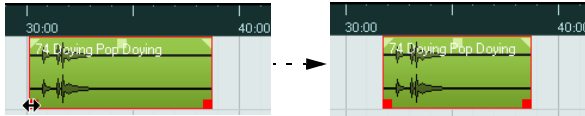


The icon on the toolbar will change, indicating the selected resizing mode.

The actual resizing is done by clicking and dragging the lower left or right corner of the event. If Snap is activated, the Snap value determines the resulting length (see [“The Snap function”](#) on [page 48](#)).



Normal sizing



Sizing moves contents

- If several events are selected, all will be resized in the same way.
- It is also possible to resize events by using the Trim buttons (located in the Nudge palette) on the toolbar. This will move the start or end position of the selected event(s) by the amount set on the Grid Type pop-up menu. The sizing type currently selected applies to this method too, with the exception of “Sizing Applies Time Stretch” which is not possible with this method. You can also use key commands for this (by default, press [Ctrl]/[Command] and use the left and right arrow key).



⇒ Note that the Nudge palette is not visible on the toolbar by default. See [“The setup context menus”](#) on [page 572](#) for instructions on how to show and hide items on the toolbar.

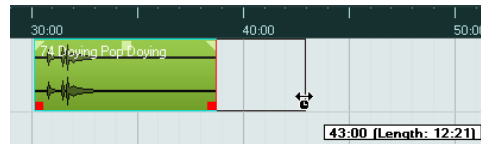
⇒ When resizing events, any automation data will not be taken into account.

Resizing events using time stretch

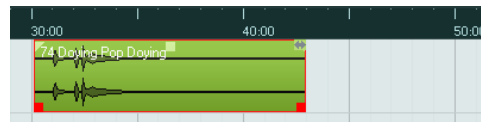
If you want to resize a part and make its contents “fit” the new size, you should use this sizing mode. Proceed as follows:

1. Click the Arrow icon on the toolbar and click again to select the “Sizing Applies Time Stretch” option from the pop-up menu.
2. Point close to the end point of the part you want to stretch.
3. Click and drag left or right.

When you move the mouse, a tooltip shows the current mouse position and length of the part. Note that the snap value applies, as with any part operation.



4. Release the mouse button.
The part is “stretched” or “compressed” to fit the new length.



- For MIDI parts, this means that the note events are stretched (moved and resized).
Controller data will be moved.
 - For audio parts, this means that the events are moved, and that the referenced audio files are time stretched to fit the new length.
A dialog shows the progress of the time stretch operation.
- ⇒ In the Preferences dialog (Editing–Audio page), you can adjust which algorithm is used for the time stretch algorithm.

For more information about time stretch, see [“Time Stretch”](#) on [page 272](#).

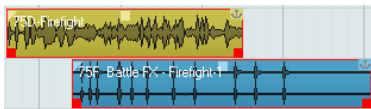
Sliding the contents of an event or part

You can move the contents of an event or part without changing its position in the Project window. By default, this is done by pressing [Alt]/[Option]-[Shift], clicking in the event or part and dragging to the left or right.

⚠ When sliding the contents of an audio event, you cannot slide past the start or end of the actual audio clip. If the event plays the whole clip, you cannot slide the audio at all.

Grouping events

Sometimes it is useful to treat several events as one unit. This can be done by grouping them: Select the events (on the same or different Tracks) and select “Group” from the Edit menu.



Grouped events are indicated by a group icon on the right.

If you edit one of the grouped events in the Project window, all other events in the same group are affected too (if applicable).

Group editing operations include:

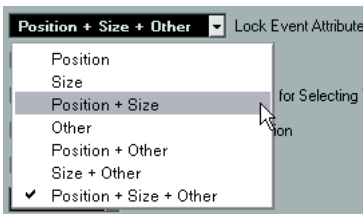
- Selecting events.
- Moving and duplicating events.
- Resizing events.
- Adjusting fade-in and fade-out (audio events only, see [“Creating fades”](#) on [page 113](#)).
- Splitting events (splitting one event will automatically split any other grouped events that are intersected by the split position).
- Locking events.
- Muting events (see below).
- Deleting events.

Locking events

If you want to make sure that you do not edit or move an event by accident, you can lock it. Locking can affect one (or any combination) of the following properties:

Lock Options	Description
Position	If this is locked, the event cannot be moved.
Size	If this is locked, the event cannot be resized.
Other	If this is locked, all other editing of the event is disabled. This includes adjusting the fades and event volume, processing, etc.

- To specify which of these properties are affected by the Lock function, use the “Lock Event Attributes” pop-up menu in the Preferences dialog (Editing page).



- To lock events, select them and select “Lock...” from the Edit menu.

The events will be locked according to the options specified in the Preferences dialog.



The padlock symbol indicates that one or more of the lock options are activated for the event.

- You can adjust the lock options for a locked event by selecting it and selecting “Lock...” from the Edit menu again. This opens a dialog in which you can activate or deactivate the desired lock options.
- To unlock an event (turn off all lock options), select it and select “Unlock” from the Edit menu.
- It is also possible to lock a whole track, by clicking the padlock symbol in the track list or in the Inspector. This disables all editing of all events on the track.

Muting events

To mute individual events in the Project window, proceed as follows:

- To mute or unmute a single event, click on it with the Mute tool.



- To mute or unmute several events, select them – either by using the standard selection techniques, or by using one of the options on the Select submenu on the Edit menu – and click on one of the selected events with the Mute tool.

All selected events will be muted.

- You can also click in an empty area with the Mute tool and drag a selection rectangle around several events you want to mute or unmute, and then click on one of them with the Mute tool.

- You can mute events by selecting them and selecting “Mute” from the Edit menu.

Similarly, you can unmute the selected events by selecting “Unmute” from the Edit menu.

- You can also change the mute status of selected events on the info line.

Muted events can be edited as usual (with the exception of adjusting fades), but are not played back.



Muted events are “grayed out”.

- You can also mute whole tracks by clicking the Mute (“M”) button in the track list, the Inspector or the Mixer. Clicking the Solo (“S”) button for a track mutes all other tracks. Note that there are two modes for the track solo function:
If the “Enable Solo on Selected Track” option is activated in the Preferences dialog (Editing–Project & Mixer page) and you have soloed a track, selecting another track in the track list will automatically solo that track instead – the solo state “moves” with the track selection.
If the option is not activated, the track you solo stays soloed, regardless of the selection.

Removing events

To remove an event from the Project window, use any of the following methods:

- Click on the event with the Erase tool.

Note that if you press [Alt]/[Option] while you click, all following events on the same track will be deleted, but not the event you clicked and all events before it.

- Select the event(s) and press [Backspace], or select “Delete” from the Edit menu.

Creating new files from events

An audio event plays a section of an audio clip, which in turn refers to one or more audio files on the hard disk. However, in some situations you may want to create a new file that consists only of the section played by the event. This is done with the function “Bounce Selection” on the Audio menu:

1. Select one or several audio events.
2. Set up fade in, fade out and event volume (on the info line or using the volume handle) as desired.
These settings will be applied to the new file. For details on fades and event volume, see [“Creating fades”](#) on [page 113](#).
3. Select “Bounce Selection” from the Audio menu.
You are asked whether you want to replace the selected event or not.
 - If you click “Replace”, a new file is created, containing only the audio in the original event. A clip for the new file is added to the Pool, and the original event is replaced by a new event playing the new clip.
 - If you click “No”, a new file is created and a clip for the new file is added to the Pool.
The original event is not replaced.

You can also apply the Bounce Selection function to an audio part. In that case, the audio from all events in the part will be combined into a single audio file. If you choose “Replace” when asked, the part will be replaced with a single audio event playing a clip of the new file.

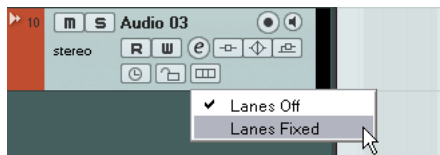
Editing in Lane Display mode

When you are recording in Stacked cycle recording mode, each take ends up on a separate lane on the track, see [“Recording audio in Stacked mode”](#) on [page 101](#) and [“Cycle Record mode: Stacked/Stacked 2 \(No Mute\)”](#) on [page 105](#). However, you can also select this lane mode manually for individual tracks, and use it when editing in the Project window. This makes it easier to view and handle overlapping events and parts.

Audio tracks

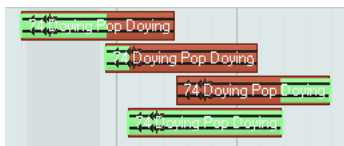
1. In the track list or in the Inspector for the selected track, click the Lane Display Type button and select “Lanes Fixed” from the pop-up menu.

The audio track is divided vertically into two lanes. By default, all audio events end up in the first (top) lane.



2. Now you can move events or parts between lanes, either by dragging or by using the “To Front” commands on the Edit menu or the context menu (this will move the event on the lane that has playback priority).

Note that if there are overlapping audio events, the audio on the lowest lane has playback priority – moving events between lanes affects what will be heard!



If the vertical zoom factor is sufficiently high, the sections that will be heard on playback are indicated in green.

- Note that there will always be an extra, empty lane at the bottom of the track – moving an event there always will add another lane.

Depending on the number of lanes used, you may want to adjust the vertical zoom for the track – simply drag the track edges in the track list.

3. After rearranging the overlapping events so that you hear what you want, you can select all events and select “Delete Overlaps” from the Advanced submenu on the Audio menu.

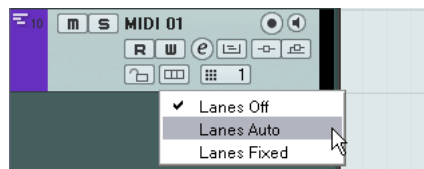
This puts all events in the top lane and resizes events so that overlapping sections are removed.

4. To turn off Lanes mode, select “Lanes Off” from the Lane Display Type pop-up menu.

If you do this without using the “Delete Overlaps” function, all overlapping sections will be kept. However, the sections that were green will now be the sections visible (“on top”) and thus the sections that will be heard.

MIDI tracks

1. In the track list or in the Inspector for the selected track, click the Lane Display Type button and select “Lanes Auto” or “Lanes Fixed”.



- In Lanes Auto mode, extra lanes will automatically be added where necessary – if two MIDI parts overlap, they will automatically be put on separate lanes.
- In Lanes Fixed mode, you have to move MIDI parts between lanes manually (by dragging them or by using the “Move to Front/Back” commands on the Edit menu or context menu).

In this mode, there will always be an extra, empty lane at the bottom of the track – if you move a part there, another lane will be added and so on.

2. You can edit the overlapping parts as usual – by cutting, deleting or muting sections in the Project window or by opening them in a MIDI editor.

In an editor, parts on different lanes will be treated just like parts on different tracks – you can use the part list pop-up menu to select an active part for editing, etc.

Note that there is no playback priority between lanes on a MIDI track – all unmuted parts will be heard during playback.

3. To merge all overlapping parts into one, make sure that the MIDI track is selected, position the left and right locators around the parts and select “Merge MIDI in Loop” from the MIDI menu.

In the dialog that opens, activate the Erase Destination option and click OK. This merges all unmuted MIDI between the locators to a single part.

4. To turn off Lanes mode, select “Lanes Off” from the Lane Display Type pop-up menu.

Range editing

Editing in the Project window is not necessarily restricted to handling whole events and parts. You can also work with selection ranges, which are independent from the event/part and track boundaries.

Creating a selection range

To make a selection range, drag with the Range Selection tool.



When the Range Selection tool is selected, the Select submenu on the Edit menu has the following items for making selection ranges:

Option	Description
All	Makes a selection that covers all tracks, from the start of the project to the end (as defined by the Length setting in the Project Setup dialog).
None	Removes the current selection range.
Invert	Only used for event selection (see “ Selecting events ” on page 67).
In Loop	Makes a selection between the left and right locator, on all tracks.
From Start to Cursor	Makes a selection on all tracks, from the start of the project to the project cursor.
From Cursor to End	Makes a selection on all tracks, from the project cursor to the end of the project.
All on Selected Tracks	Only used for event selection (see “ Selecting events ” on page 67).
Select Event	This is available in the Sample Editor (see “ Using the Select menu ” on page 289).
Left Selection Side to Cursor	Moves the left side of the current selection range to the project cursor position.
Right Selection Side to Cursor	Moves the right side of the current selection range to the project cursor position.

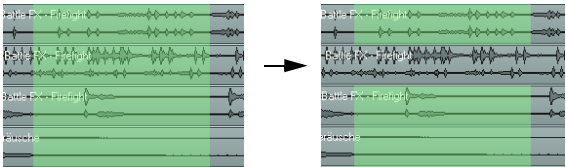
Option	Description
Range to Next Event	Moves the selection range to the next event head or tail on the selected track(s) and turns it to a zero selection.
Range to Previous Event	Moves the selection range to the previous event head or tail on the selected track(s) and turns it to a zero selection.
Enlarge Range to Next Event	Moves the right side of the current selection range to the next event head or tail on the selected track(s).
Enlarge Range to Previous Event	Moves the left side of the current selection range to the previous event head or tail on the selected track(s).

▪ Double-clicking on an event with the Range Selection tool creates a selection range encompassing the event. If you hold down [Shift] you can double-click several events in a row, and the selection range will expand to encompass them all. Double-clicking a second time on an event opens it for editing in the Sample Editor.

Making selection ranges for several non-contiguous tracks

You can create selection ranges that cover several tracks. It is also possible to exclude tracks from a selection range:

1. Create a selection range from the first to the last desired track.
2. Press [Alt]/[Option] and click in the selection range on the tracks you want to exclude from the selection.



3. In the same manner, you can add a track to the selection range by [Alt]/[Option]-clicking in the selection range area on the track.

▪ If you press [Shift]-[Alt]/[Option] while creating a selection range, the range will encompass all tracks in the track list.

The Range Selection pop-up menu

If you want to work with different selection ranges the Range Selection pop-up menu comes in handy. Activating one of the options (Selection A or Selection B) from the pop-up menu will not only select the corresponding selection but also cause the event display to switch between the two locations.

Proceed as follows:

1. With the Range Selection tool, define a destination range for your selection.

By default, the first selection you perform will be selection A. The letter currently displayed on the tool icon shows which selection range you are to define.

2. Click on the Range Selection tool again and select Selection B from the pop-up menu.

This switches the selection ranges.



3. Define the destination range for selection B.

You can now select your defined ranges by opening the Range Selection pop-up menu and choosing the desired option.

⚠ When you are done do not forget to deactivate the Range Selection tool. Otherwise, you might accidentally overwrite your defined selections.

Editing selection ranges

Adjusting the size of the selection range

You can adjust the size of a selection range in the following ways:

- By dragging its edges.

The pointer takes the shape of a double arrow when you move it over an edge of the selection range.

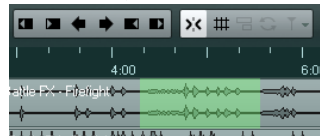
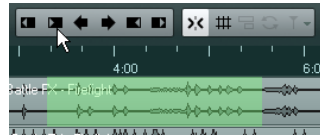
- By holding down [Shift] and clicking.

The closest selection range edge will be moved to the position at which you clicked.

- By adjusting the selection range start or end position on the info line.

- By using the Trim buttons on the toolbar.

The left Trim buttons will move the start of the selection range and the right buttons will move the end. The edges will be moved by the amount specified on the Grid pop-up menu.



- By using the Nudge buttons on the toolbar.

These will move the whole selection range to the left or the right. The amount of movement depends on the selected display format (see [“The Project Setup dialog”](#) on page 57) and the value specified on the Grid pop-up menu.

⚠ Note that the contents of the selection are not moved – using the Nudge buttons is the same as adjusting the start and end of the selection range at the same time, by the same amount.

⇒ The Trim buttons and the Nudge buttons are located in the Nudge palette, which is not visible on the toolbar by default.

See [“The setup context menus”](#) on page 572 for instructions on how to show and hide items on the toolbar.

Moving and duplicating

- To move a selection range, click and drag it to a new position.

This will move the contents of the selection range to the new position. If the range intersected events or parts, these will be split before moving, so that only the sections within the selection range are affected.

- To duplicate a selection range, hold down [Alt]/[Option] and drag.

You can also use the Duplicate, Repeat and Fill Loop functions, just as when duplicating events (see [“Duplicating events”](#) on page 71).

Using Cut, Copy, and Paste

When working with selection ranges, you can either use Cut, Copy and Paste on the Edit menu, or use the functions “Cut Time” and “Paste Time” on the Range submenu on the Edit menu. These work differently to their related functions on the Edit menu:

Function	Description
Cut	Cuts out the data in the selection range and moves it to the clipboard. The selection range is replaced by empty track space in the Project window, meaning that events to the right of the range keep their positions.
Copy	Copies the data in the selection range to the clipboard.
Paste	Pastes the clipboard data at the start position and track of the current selection. Existing events are not moved to make room for the pasted data.
Paste at Origin	Pastes the clipboard data back at its original position. Existing events are not moved to make room for the pasted data.
Cut Time	Cuts out the selection range and moves it to the clipboard. Events to the right of the removed range are moved to the left to fill out the gap.
Paste Time	Pastes the clipboard data at the start position and track of the current selection. Existing events are moved to make room for the pasted data.
Paste Time at Origin	Pastes the clipboard data back at its original position. Existing events are moved to make room for the pasted data.

Deleting selection ranges

Again, you can either use “regular” Delete or “Delete Time”:

- If you use the Delete function on the Edit menu (or press [Backspace]), the data within the selection range is replaced by empty track space. Events to the right of the range keep their position.
- If you use “Delete Time” on the Edit menu’s Range submenu, the selection range is removed and events to the right are moved to the left to close up the gap.

Other functions

On the Range submenu on the Edit menu, you will find three more range editing functions:

Function	Description
Global Copy	This copies everything in the selection range.
Split	Splits any events or parts that are intersected by the selection range, at the positions of the selection range edges.

Function	Description
Crop	All events or parts that are partially within the selection range are cropped, that is, sections outside the selection range are removed. Events that are fully inside or outside the selection range are not affected.
Insert Silence	Inserts empty track space from the start of the selection range. The length of the silence equals the length of the selection range. Events to the right of the selection range start are moved to the right to “make room”. Events that are intersected by the selection range start are split, and the right section is moved to the right.

Region operations

Regions are sections within a clip, with various uses. While regions are perhaps best created and edited in the Sample Editor (see “[Working with regions](#)” on [page 291](#)), the following region functions are available in the Advanced submenu of the Audio menu:

Function	Description
Event or Range as Region	This function is available when one or several audio events or selection ranges are selected. It creates a region in the corresponding clip, with the start and end position of the region determined by the start and end position of the event or selection range within the clip.
Events from Regions	This function is available if you have selected an audio event whose clip contains regions within the boundaries of the event. The function will remove the original event and replace it with event(s) positioned and sized according to the Region(s).

The Edit History dialog

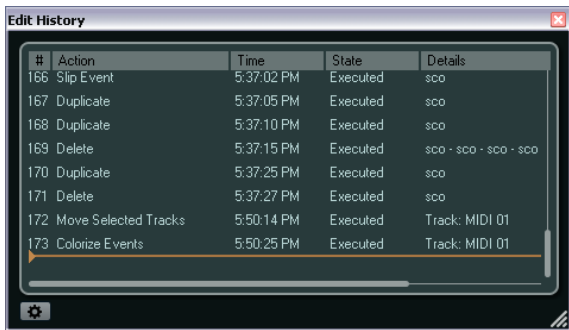
In the Edit History dialog you can undo and redo many edit actions. Actions that can be undone include all functions in the Project window as well as in the editors. It is also possible to undo audio processes or applied plug-in effects. However, these are better removed and modified using the Offline Process History (see “[The Offline Process History dialog](#)” on [page 275](#)).

⇒ In the Preferences dialog (General page) you can limit the Undo function by setting the number in the “Maximum Undo” field to the desired value. This is useful if you run out of hard disk space, for example.

To undo and redo your actions, proceed as follows:

1. On the Edit menu, select “History...”.

The Edit History dialog opens.



The dialog contains a list of all your edits, with the most recent action at the bottom of the list. The Action column displays the name of the action while the Time column tells you when this action was performed. In the Details column further details are shown. Here you can enter new text by double-clicking in the column.

2. Move the horizontal, colored line upwards to the desired position to undo your actions.

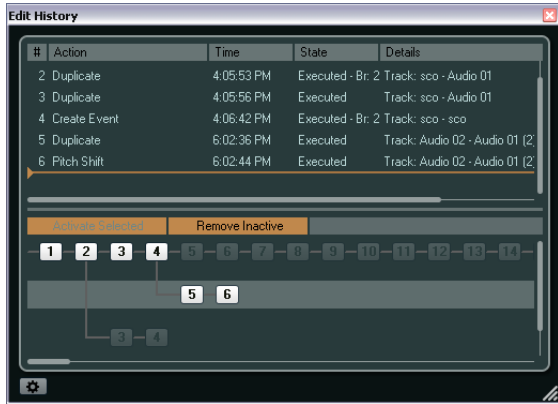
You can only undo your actions in reverse order, i.e. the last performed action is the first action to be undone.

3. Move the line down the List again to redo an action that was undone previously.

Working with branches

If you activate the “Use Undo Branches” option in the Preferences dialog (General page), actions are gathered in branches. This way you do not have to undo every single action you performed, instead you can undo whole branches.

A branch is created when you have undone at least one action. All following actions you perform will then be gathered in a new branch.



If you have two or more branches, you can choose to undo edits of the separate branches. Proceed as follows:

1. Select the desired branch by clicking on it in the lower part of the dialog.

The corresponding actions are listed in the upper part of the dialog.

2. Click the “Activate Selected” button or click a second time on the branch to activate it.

All actions from the subsequent branches are undone while all actions of the now active branch are redone.

If you undo some of the actions and then perform new edit operations, a new child branch is created at that position in the tree.

When you are happy with your edits and you do not need the inactive branches any longer, you can choose to remove them. Proceed as follows:

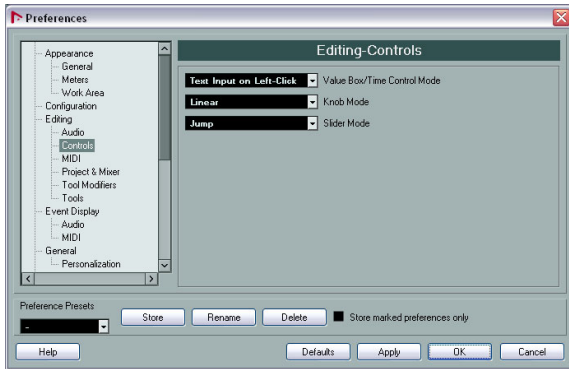
- Click the “Remove Inactive” button.

All inactive branches are removed, leaving only the active actions on a single, linear branch.

You can now undo separate actions of the branch as usual in the upper part of the dialog.

⚠ Removing inactive branches cannot be undone!

The Preferences dialog



When you open the File menu (the Nuendo menu on a Mac) and select “Preferences...”, the Preferences dialog opens. This dialog provides a large number of options and settings that control the global behavior of Nuendo.

The dialog has a number of pages, each containing options and settings belonging to a particular topic.

- In the list on the left, click on one of the entries to open the corresponding page.
- You can find detailed descriptions of all Preferences options in the dialog help, opened by clicking the Help button at the bottom left of the dialog.

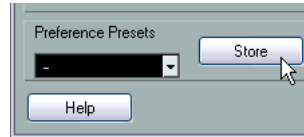
About preference presets

In the Preferences dialog it is possible to save complete or partial preference settings as presets. This lets you recall settings quickly and easily.

Saving a preference preset

When you have made your preferences settings, proceed as follows to save all settings as a preset:

1. Make sure that the “Store marked preferences only” option is not activated.
This is because this option is used for saving partial settings (see below), as opposed to complete settings.
2. Click the Store button in the lower left section of the Preferences dialog.



A dialog opens, allowing you to type in a name for the preset.

3. Click OK to save the preset.
Your saved settings are now available from the Preference Presets pop-up menu.

Loading a preference preset

To load a saved preference preset, simply select a preset from the Preference Presets pop-up menu. The preset is applied immediately.

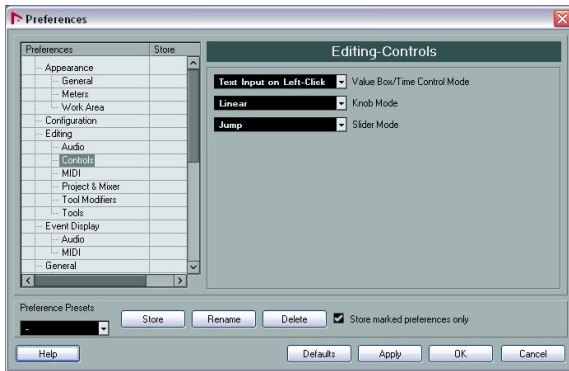
Saving partial preferences settings

It is also possible to save partial preferences settings. This is useful when you have made settings that only relate to a certain project or situation, for example. When you apply a saved partial preference preset, you only change the saved settings. All other preferences will be left unchanged.

When you have made your specific preferences settings, proceed as follows to save the partial settings as a preset:

1. Activate “Store marked preferences only”.

A new “Store” column is added to the Preferences list.



2. Click in the Store column of the Preferences items you wish to save.

Note that if you activate a Preferences page that contains subpages, these will also be activated. If this is not what you want, simply deactivated the subpages.

3. Click the Store button in the lower left section of the Preferences dialog.

A dialog opens, asking you to type in a name for the preset. It is a good idea to choose a descriptive name for a partial preference preset, preferably relating to the saved settings (for example “Configuration” or “Editing–Controls”).

4. Click OK to save.

Your saved settings are now available from the Preference Presets pop-up menu.

Any Project window editing you perform to a folder part affects all the events and parts it contains. You can select several folder parts if you like – this allows you to handle and edit them together. The editing you can perform includes:

- Moving a folder part. This will move its contained events and parts (possibly resulting in other folder parts, depending on how the parts overlap).
- Using cut, copy and paste.
- Deleting a folder part. This will delete its contained events and parts.
- Splitting a folder part with the Scissors tool.

- Gluing folder parts together with the Glue tube tool. This will only work if the adjacent folder parts contain events or parts on the same track.
- Resizing a folder part resizes the contained events and parts according to the selected resizing method, see [“Resizing events”](#) on [page 72](#).
- Muting a folder part. This will mute its contained events and parts.

Tracks inside a folder can be edited as one entity by performing the editing directly on the folder part containing the tracks. You can also edit individual tracks within the folder by showing the contained tracks, selecting parts and opening editors as usual.

Double-clicking a folder part opens the editors for the corresponding track classes present in the folder. The following applies:

- All MIDI parts located on the tracks within the folder are displayed as if they were on the same track, just like when opening the Key Editor with several MIDI parts selected. To be able to easily discern the different tracks in the editor, give each track a different color in the Project window and use the “Part Colors” option in the editor (see [“Coloring notes and events”](#) on [page 410](#)).
- If the folder contains tracks with audio events and/or audio parts, the Sample and/or Audio Part Editors are opened with each audio event and audio part in a separate window.

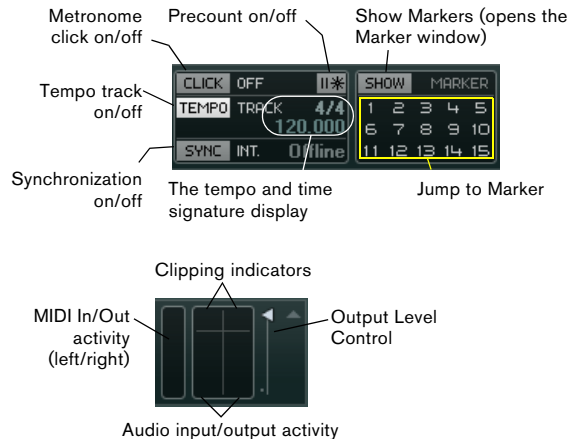
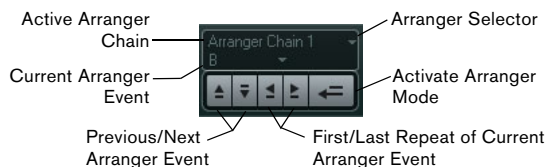
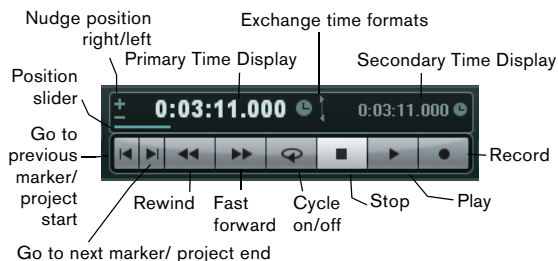
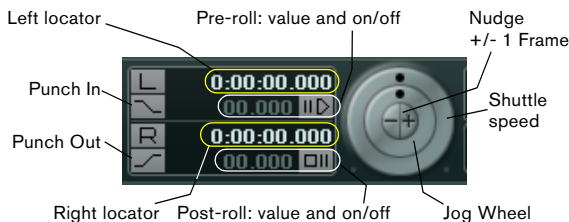
Background

This chapter describes the various methods available for controlling playback and transport functions in Nuendo.

The Transport panel

Below you can find a brief description of each item on the Transport panel.

The pictures below show the Transport panel with all controls visible. The Transport panel is divided into the following sections, from left to right.



⇒ The Output Activity and Clipping indicator as well as the Output Level Control refer to the Control Room channel, if the Control Room is activated. If the Control Room is disabled, these controls refer to the Main Mix Output bus as defined on the Outputs tab in the VST Connections window. For information on the Control Room, see the chapter [“Control Room”](#) on [page 179](#).

- The main Transport functions (Cycle/Stop/Play/Record) can also be shown on the toolbar.



In addition, various play options are available on the Transport menu.

Hiding and showing the Transport panel

The Transport panel is shown automatically when you launch a new project. To hide or show it, select “Transport Panel” on the Transport menu (or use a key command – by default [F2]).

About Pre-roll and Post-roll

These items are described in the chapter “Recording”, see [“About Pre-roll and Post-roll”](#) on [page 108](#).

Changing the Transport panel setup

You can customize the appearance of the Transport panel by right-clicking anywhere on the panel and selecting/deselecting the corresponding options on the context menu.

This is described in detail in the section [“The setup context menus”](#) on [page 572](#).

The numeric keypad

In the default Key Command settings, various Transport panel operations are assigned to the numeric keypad on the computer keyboard. The keypads are slightly different on PC and Macintosh computers:

Numeric Key	Function
[Enter]	Play
[+]	Fast Forward
[-]	Rewind
[*]	Record
[+] (Win)/[/] (Mac)	Cycle On/Off
[.]	Return to Zero
[0]	Stop
[1]	Go to Left Locator
[2]	Go to Right Locator
[3-9]	Go to marker 3 to 9

Operations

Setting the project cursor position

There are several ways to move the project cursor position:

- By using Fast Forward and Rewind.
- By using the Jog/Shuttle/Nudge control on the Transport panel (see [“The shuttle speed control”](#) on [page 87](#)).
- By dragging the project cursor in the lower part of the ruler.
- By clicking in the ruler.
Double-clicking in the ruler moves the cursor and starts/stops playback.
- If the “Locate when Clicked in Empty Space” option is activated in the Preferences dialog (Transport page) you can click anywhere in an empty section of the Project window to move the cursor position.
- By changing the value in any of the position displays.

- By using the position slider above the transport buttons in the Transport panel.

The range of the slider relates to the Length setting in the Project Setup dialog. Hence, moving the slider all the way to the right will take you to the end of the project.

- By using markers (see the chapter [“Using markers”](#) on [page 136](#)).
- By using playback options (see [“Playback functions”](#) on [page 88](#)).
- By using the arranger function (see [“The arranger track”](#) on [page 122](#)).
- By using functions on the Transport menu.

The following functions are available:

Function	Description
Locate Selection/Locate Selection End	Moves the project cursor to the beginning or end of the current selection. For this to be available, you must have selected one or more events or parts, or made a selection range.
Locate Next/Previous Marker	This moves the project cursor to the closest marker to the right or left (see “Marker tracks” on page 44).
Locate Next/Previous Event	This moves the project cursor forwards or backwards respectively, to the closest beginning or end of any event on the selected track(s).

⇒ If Snap is activated when dragging the project cursor, the Snap value is taken into account. This is helpful for finding exact positions quickly.

⇒ There are also numerous key commands available for moving the project cursor (in the Transport category in the Key Commands dialog). For example, you can assign key commands to the “Step Bar” and “Step Back Bar” functions, allowing you to move the project cursor in steps of one bar, backwards and forwards.

About the Transport panel display formats



Primary time display (left) and secondary time display (right)

The time unit shown in the ruler can be independent from the time unit shown in the main time display on the Transport panel. This means that you can display timecode in the transport position display and bars and beats in the ruler, for example. In addition, there is a secondary time display to the right of the primary time display which is

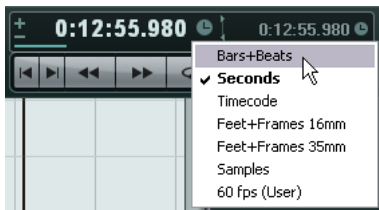
also independent, giving you three different time units shown at the same time (in the Project window, you can also create additional ruler tracks – see [“Using multiple rulers – ruler tracks”](#) on [page 47](#)).

The following rules apply:

- If you change the time format of the primary time display on the Transport panel, the time format of the ruler will be changed as well.

This is the same as changing the display format in the Project Setup. Therefore, to have different display formats in the ruler and the main time display you should change the format in the ruler.

- The primary time display format is set on the pop-up menu to the right in the main position display.



- This setting also determines the time format displayed for the left and right locators on the Transport panel.
- The secondary time display is completely independent, and the display format is set on the pop-up menu to the right in the secondary time display.
- You can swap time formats between the primary and secondary time displays by clicking the double arrow symbol between them.

The left and right locators

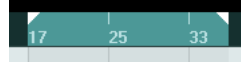
The left and right locators are a pair of position markers used for specifying punch-in and punch-out positions during recording, and as boundaries for cycle playback and recording.

⇒ When cycle mode is activated on the Transport panel, the area between the left and right locators will be repeated (cycled) on playback. However, if the right locator is positioned before the left, this will work as a “jump” or “skip mode” – when the project cursor reaches the right locator it will immediately jump to the left locator position and continue playback from there.

There are several ways to set locator positions:

- To set the left locator, press [Ctrl]/[Command] and click at the desired position in the ruler.

Similarly, pressing [Alt]/[Option] and clicking in the ruler sets the right locator. You can also drag the locator “handles” directly in the ruler.



The locators are indicated by the “flags” in the ruler. The area between the locators is highlighted in the ruler and in the Project window (see [“Appearance”](#) on [page 576](#)). Note that if the right locator is before the left locator, the color of the ruler between the locators will change.

- Click and drag in the upper half of the ruler to “draw” a locator range.

If you click on an existing locator range, you can drag to move it.

- Pressing [Ctrl]/[Command] and pressing [1] or [2] on the numeric keypad sets the left or right locator to the project cursor position.

Similarly, you can press [1] or [2] on the numeric keypad (without [Ctrl]/[Command]) to set the project cursor position to the left or right locator position. Note that these are default key commands – you can change these if you like.

- By creating cycle markers you can store any number of left and right locator positions, which can be recalled by simply double-clicking on the corresponding marker (see [“Editing markers on marker tracks”](#) on [page 142](#)).

- The “Locators to Selection” item on the Transport menu (default key command [P]) sets the locators to encompass the current selection.

This is available if you have selected one or several events or made a selection range.

- You can also adjust the locators numerically on the Transport panel.

Clicking the L/R buttons in the locator section on the Transport panel will move the project cursor to the respective locator. If you press [Alt]/[Option] and click the L or R button, the corresponding locator will be set to the current project cursor position.

The shuttle speed control



The shuttle speed control (the outer wheel on the Transport panel) allows you to play back the project at any speed (four times the playback speed at maximum), forwards or backwards. This is a quick way to locate or “cue” to any position in the project.

- Turn the shuttle speed wheel to the right to start playback.

The further to the right you move the wheel, the faster the playback speed.

- If you turn the wheel to the left instead, the project will play backwards.

The speed depends on how far to the left you turn the wheel.

- The “Use Inserts While Scrubbing” option in the Preferences (Transport–Scrub page) allows you to activate insert effects for scrubbing with the shuttle speed control. By default, insert effects are bypassed.

⇒ You can also access the shuttle speed control via a remote control device.

Project scrubbing – the jog wheel



The middle wheel on the Transport panel serves as a jog wheel. By clicking and turning it to the right or left you will move the playback position manually forwards or backwards – much like scrubbing on a tape deck. This helps you pinpoint exact locations in the project.

- Note that the jog wheel is an “endless rotary encoder” – you can turn it as many times as needed to move to the desired location.

The faster you turn the wheel, the faster the playback speed. The original playback speed is the fastest speed possible.

- If you click the jog wheel during playback, playback automatically stops and scrubbing starts.

- The “Use Inserts While Scrubbing” option in the Preferences dialog on the Transport–Scrub page allows you to activate insert effects for scrubbing with the jog wheel. By default, insert effects are bypassed.

⇒ You can also use a jog wheel on a remote controller for scrubbing.

The nudge position buttons

The “+” and “–” buttons in the middle of the Shuttle/Jog section allow you to nudge the project cursor position one frame at a time to the right or left.

Options and Settings

The “Return to Start Position on Stop” preference

This setting is found on the Transport page in the Preferences dialog (opened from the File menu under Windows, or the Nuendo menu under Mac OS X).

- If “Return to Start Position on Stop” is activated when you stop playback, the project cursor will automatically return to the position where recording or playback last started.

- If “Return to Start Position on Stop” is deactivated, the project cursor will remain at the position where you stop playback.

Pressing Stop again will return the project cursor to the position where recording or playback last started.

About track disable/enable

For audio tracks, the track context menu contains an item named “Disable Track”. This shuts down all disk activity for the track, as opposed to using Mute, which merely turns down the output volume for a track. For example, if you often record “alternative takes” you can easily build up a large number of takes on different tracks. Even though these tracks are muted, they are actually still “playing back” from the hard disk during playback. This puts an unnecessary load on your disk system, so using “Disable Track” is recommended for such situations.

- Select “Disable Track” for tracks that you want to keep in the project for later use but do not want to play back now. The track color changes to indicate that the track is disabled.

- Select “Enable Track” from the track context menu to re-enable disabled tracks.

Playback functions

Apart from the standard transport controls on the Transport panel, you can also find a number of functions on the Transport menu that can be used to control playback. The items have the following functionality:

Option	Description
Post-roll from Selection Start/End	Starts playback from the beginning or end of the currently selected range and stops after the time set in the Post-roll field on the Transport panel.
Pre-roll to Selection Start/End	Starts playback from a position before the start or end of the currently selected range and stops at the selection start or end, respectively. The playback start position is set in the Pre-roll field on the Transport panel.
Play from Selection Start/End	Activates playback from the beginning or end of the current selection.
Play until Selection Start/End	Activates playback two seconds before the start or end of the current selection and stops at the selection start or end, respectively.
Play until Next Marker	This activates playback from the project cursor and stops at the next marker.
Play Selection Range	This activates playback from the start of the current selection and stops at the selection end.
Loop Selection	This activates playback from the start of the current selection and keeps starting over again when reaching the selection end.

⚠ The functions listed above (except “Play until Next Marker”) are only available if you have selected one or more events or made a selection range.

⇒ In the Preferences dialog (Editing–Audio page) you will find the “Treat Muted Audio Events like Deleted” option. When you activate this option, any events overlapped by a muted event will become audible.

About Chase

Chase is a function that makes sure your MIDI instruments sound as they should when you locate to a new position and start playback. This is accomplished by the program transmitting a number of MIDI messages to your instruments each time you move to a new position in the project, making sure all MIDI devices are set up correctly with regard to program change, controller messages (such as MIDI Volume), etc.

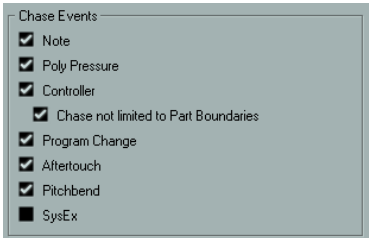
For example, let’s say you have a MIDI track with a program change event inserted at the beginning. This event makes a synth switch to a piano sound.

At the beginning of the first chorus you have another program change event which makes the same synth switch to a string sound.

You now play back the song. It begins with the piano sound and then switches to the string sound. In the middle of the chorus you stop and rewind to some point between the beginning and the second program change. The synth will now still play the string sound although in this section it really should be a piano!

The Chase function takes care of that. If program change events are set to be chased, Nuendo will track the music back to the beginning, find the first program change and transmit it to your synth, setting it to the correct sound.

The same thing can apply to other event types as well. The Chase Events settings in the Preferences dialog (MIDI page) determine which event types will be chased when you locate to a new position and start playback.



⇒ Event types for which the checkbox is activated here will be chased.

- In this section of the Preferences dialog, you will also find the “Chase not limited to Part Boundaries” option. When you activate this option, MIDI controllers are also chased outside the part boundaries, i.e. the Chase will be performed on the part touched by the cursor as well as on all the parts to the left of it. Please note that this option should be deactivated for very large projects, as it considerably slows down operations such as positioning and soloing. When you deactivate this option, the MIDI controllers are only chased within the parts under the position cursor.

The Virtual Keyboard (Nuendo Expansion Kit only)

The Virtual Keyboard can be displayed in the Transport panel. It allows you to play and record MIDI notes by using your computer keyboard or mouse. This is useful if you have no external MIDI instrument at hand and you do not want to draw in notes with the Pencil tool. The Virtual Keyboard can perform all functions that can be controlled by external MIDI keyboards, e.g. playing and recording MIDI notes.

⚠ When the Virtual Keyboard is displayed, the usual key commands are blocked because they are reserved for the Virtual Keyboard. The only exceptions are: [Ctrl]/[Command]-[S] (Save), Num [*] (Start/Stop Record), [Space] (Start/Stop Playback), Num [1] (Jump to left locator), [Delete] or [Backspace] (Delete), Num [/] (Cycle on/off), [F2] (Show/Hide Transport panel), and [Alt]/[Option]-[K] (Show/Hide Virtual Keyboard).

- You can choose between two different keyboard display modes: computer keyboard and piano keyboard. To switch between these two modes, click the “Change Virtual Keyboard Display Type” button in the lower right corner of the Virtual Keyboard section or use the [Tab] key.



The Virtual Keyboard in computer keyboard display mode



The Virtual Keyboard in piano keyboard display mode

To record MIDI using the Virtual Keyboard, proceed as follows:

- Create or choose a MIDI or an instrument track and activate the “Record Enable” button for it.
- Open the Virtual Keyboard by selecting “Virtual Keyboard” on the Devices menu, by pressing [Alt]/[Option]-[K] or by right-clicking on the Transport panel and selecting “Virtual Keyboard” on the context menu. The Virtual Keyboard is displayed in the Transport panel.

- Activate the Record button and press a key on your computer keyboard to enter a note.

You can also click on the keys of the Virtual Keyboard to enter notes.

- You can also press several keys simultaneously to enter polyphonic parts. The maximum number of notes that can be played at one time varies between the different operating systems and hardware configurations.

- Use the fader “Note velocity level” to the right of the virtual keyboard to adjust the volume.

You can also use the up and down arrow keys for this.

- Enter the desired notes this way.

- When you are done, hit the Stop button and close the Virtual Keyboard.

When the Virtual Keyboard is hidden, all key commands are available again.

Options and settings

- In piano keyboard mode, you have a wider range of keys at your disposal, allowing you to enter two voices simultaneously, for example bass and lead voice or bass drums and HiHats.

In computer keyboard mode, you can use the two rows of keys that are displayed on the Virtual Keyboard to enter notes. In piano keyboard mode, you can also use the two rows of keys below these.

- You have seven full octaves at your disposal. Use the “Octave Offset” buttons at the bottom of the virtual keyboard to offset the octave range of the keyboard.

You can also use the left and right arrow keys to switch the keyboard range to a lower or higher octave, respectively.



- In piano keyboard mode, you can use the two sliders to the left of the keyboard to introduce pitchbend (left slider) or modulation (right slider).

You can also click on a key, hold the mouse button pressed until the mouse pointer becomes a crosshair tool and drag upwards/downward to introduce modulation or left/right to create pitchbend.



8

Recording

Background

This chapter describes the various recording methods that you can use in Nuendo. As it is possible to record both audio and MIDI tracks, both recording methods are covered in this chapter.

Before you start

This chapter assumes that you are reasonably familiar with certain basic recording concepts, and that the following initial preparations have been made:

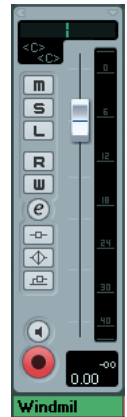
- You have properly set up, connected and calibrated your audio hardware.
- You have opened a project and set the project setup parameters to your specifications.
Project setup parameters determine the record format, sample rate, project length, etc. that affect the audio recordings you make during the course of the project, see [“The Project Setup dialog”](#) on [page 57](#).
- If you plan to record MIDI, your MIDI equipment has to be set up and connected correctly.

Basic recording methods

This section describes the general methods used for recording. However, there are additional preparations and procedures that are specific to audio and MIDI recording respectively. Make sure to read these sections before you start recording (see [“Audio recording specifics”](#) on [page 93](#) and [“MIDI recording specifics”](#) on [page 103](#)).

Record-enabling tracks

Nuendo can record on a single track or on several tracks (audio and/or MIDI) simultaneously. To make a track ready for recording, activate the Record Enable button for the track in the track list, in the Inspector, or in the Mixer.



Record Enable in the Inspector, track list, and Mixer

- ⇒ If the “Enable Record on Selected Track” option is activated in the Preferences dialog (Editing–Project & Mixer page), tracks are automatically record-enabled when you select them in the track list.
- ⇒ You can set up key commands to record-enable all audio tracks simultaneously and to deactivate Record Enable for all audio tracks (Arm/Disarm all Audio Tracks). You will find these commands in the Key Commands dialog, in the Mixer category (see [“Setting up key commands”](#) on [page 581](#)).
- ⇒ The exact number of audio tracks you can record simultaneously depends on your computer CPU and hard disk performance. In the Preferences dialog (VST page), you can find the “Warn on Processing Overloads” option. When this is activated, a warning message will be displayed as soon as the CPU clip indicator (on the Transport panel) lights up during recording.

Manually activating recording

You activate recording by clicking the Record button on the Transport panel or toolbar or by using the corresponding key command (by default [*] on the numeric keypad).

Recording can be activated in Stop mode (from the current cursor position or from the left locator) or during playback:

- If you activate recording in Stop mode, and the “Start Record at Left Locator” option is activated on the Transport menu, recording will start from the left locator. The pre-roll setting or the metronome count-in will be applied (see “About Pre-roll and Post-roll” on [page 108](#)).
- If you activate recording in Stop mode, and “Start Record at Left Locator” is deactivated, recording will start from the current project cursor position.
- If you activate recording during playback, Nuendo will immediately enter Record mode and start recording from the current project cursor position. This is known as “manual punch in”.

Activating recording in Sync mode

If you are synchronizing the Nuendo transport to external equipment (Sync is activated on the Transport panel) and you activate recording, the program will go into “record ready” mode (the record button on the Transport panel will light up). In this case, recording will start when a valid timecode signal is received (or when you click the Play button). See the chapter “Synchronization” on [page 496](#) for more information.

Automatically activating recording

Nuendo can automatically switch from playback to recording at a given position. This is known as “automatic punch in”. A typical use for this is if you need to replace a section of a recording, and want to listen to what is already recorded, up to the recording start position.

1. Set the left locator to the position where you want recording to start.
2. Activate the Punch In button on the Transport panel.



Punch In activated

3. Activate playback from some position before the left locator.

When the project cursor reaches the left locator, recording is automatically activated.

Stopping recording

Again, this can be done automatically or manually:

- If you click the Stop button on the Transport panel (or use the corresponding key command, by default [0] on the numeric keypad), recording is deactivated and Nuendo goes into Stop mode.
- If you click the Record button (or use the key command for recording, by default [*]), recording is deactivated but playback continues. This is known as “manual punch out”.
- If the Punch Out button is activated on the Transport panel, recording will be deactivated when the project cursor reaches the right locator. This is known as “automatic punch out”. By combining this with automatic punch in, you can set up a specific section to record – again very useful if you want to replace a certain part of a recording (see also “Stop after Automatic Punch Out” on [page 108](#)).



Punch In and Out activated

Cycle recording

Nuendo can record and play back in a cycle – a loop. You specify where the cycle starts and ends by setting the left and right locators. When the cycle is active, the selected section is seamlessly repeated until you hit Stop or deactivate cycle mode.

- To activate cycle mode, click the cycle button on the Transport panel.



Cycle activated

- To record in cycle mode, you can start recording from the left locator, from before the locators or from within the cycle, in Stop mode or during playback.

As soon as the project cursor reaches the right locator, it will jump back to the left locator and continue recording a new lap.

- The results of cycle recording depend on the selected cycle record mode and are different for audio (see [“Recording audio in cycle mode”](#) on page 99) and MIDI (see [“Recording MIDI in cycle mode”](#) on page 105).

Audio pre-record

This feature allows you to capture up to 1 minute of any incoming audio you play in Stop mode or during playback, “after the fact”. This is possible because Nuendo can capture audio input in buffer memory, even when not recording.

Proceed as follows:

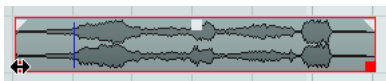
1. Open the Preferences dialog (Record–Audio page).
2. Specify a time (up to 60 seconds) in the “Audio Pre-Record Seconds” field.
This activates the buffering of audio input, making Pre-Record possible.
3. Make sure an audio track is record-enabled and receives audio from the signal source.
4. When you have played some audio material you want to capture (either in Stop mode or during playback), click the Record button.

5. After a few seconds stop the recording.

An audio event is created, starting at where the cursor position was when you activated recording. If you were in stop mode and the cursor was at the beginning of the project, you may have to move the event to the right in the next step. If you were playing along to a project you, leave the event where it is.

6. Select the Arrow tool and place the cursor on the bottom left edge of the event so that a double arrow appears, then click and drag to the left.

Now the event is extended and the audio you played before activating record is inserted – this means that if you played along during playback, the captured notes will end up exactly where you played them in relation to the project.



The position where the recording was activated is indicated by a colored line in the audio event.

Audio recording specifics

Selecting a recording file format

The format for recorded files is set in the Project Setup dialog on the Project menu. There are three settings: Sample Rate, Bit Resolution, and Record File Type. While the sample rate is set once and for all when you start working on a new project, the bit resolution and file type can be changed at any time.

Record File Type

The Record File Type setting determines which type of files will be created when you record:

File type	Description
Wave File	Wave files have the extension “.wav” and are a common file format on the PC platform.
Wave 64 File	Wave 64 is a proprietary format developed by Sonic Foundry Inc. Audio-wise it is identical to the Wave format, but the internal file structure makes much larger file sizes possible. This is useful for long live recordings in surround format, where the audio files can become huge.
Broadcast Wave File	In terms of audio content, the same as regular Wave files, but with embedded text strings for supplying additional information about the file (see below).
AIFF File	Audio Interchange File Format, a standard defined by Apple Inc. AIFF files have the extension “.aif” and are used on most computer platforms. Like Broadcast Wave files, AIFF files can contain embedded text strings (see below).

- If you select Broadcast Wave File or AIFF format, you can specify Author, Description and Reference text strings that will be embedded in the recorded file.

This is done on the Record–Audio–Broadcast Wave page in the Preferences dialog.

Bit Resolution

The available options are 16 bit, 24 bit, and 32 bit float. Use the following guidelines:

- Normally, select the record format according to the bit resolution delivered by your audio hardware.
For example, if your audio hardware has 20 bit A/D converters (inputs), you may want to record at 24 bit resolution to capture the full bit resolution. On the other hand, if your hardware has 16 bit inputs, it is pointless to record with a higher bit resolution – this will only make the audio files larger, with no difference in audio quality. The exception is if you record with effects – see [“Recording with effects”](#) on page 101.

- The higher the bit resolution, the larger the files and the more strain is put on the disk system.

If this is an issue, you may want to lower the record format setting.

⚠ For further information on the options in the Project Setup dialog, see [“The Project Setup dialog”](#) on [page 57](#).

RAM requirements for recording

When recording live music performances, or during large postproduction projects, you will often simultaneously record on a large number of tracks at the same time.

Each track on which you record requires a certain amount of RAM, and the memory usage increases the longer the recording lasts.

Please consider the RAM limitation (see [“RAM”](#) on [page 24](#)) of your operating system when setting up your project for recording.

⚠ When a recording has used up all the memory made available by the operating system, the computer will crash.

For each audio channel, 2.4MB of RAM are required for mixer settings, etc. One minute of audio recording with a sample rate of 96kHz on a mono track will increase memory usage by another 176KB (Windows Task Manager, average).

Examples:

- Recording on a Windows 32Bit system with 64 mono tracks at a sample rate of 44.1 kHz, lasting 60 minutes. This would require a total of 403MB of memory – not a problem on a modern computer.
 - Recording on a Windows 32Bit system with 128 mono tracks at a sample rate of 96kHz, lasting 60 minutes. This would require 1658MB of memory – dangerously close to the 2GB limit for RAM on a Windows 32 Bit computer.
- ⇒ Also note that the maximum file size for regular Wave files is 2GB. If you want to record larger files, use the Waves 64 format (see [“Record File Type”](#) on [page 93](#)).

Setting up the track

Creating a track and selecting the channel configuration

Audio tracks can be configured as mono, stereo or surround tracks, with almost any combination of channels (LCRS, 5.1, 7.1, 10.2, etc). This allows you to record or import a file containing multiple channels and treat it as one entity, with no need to split it up into several mono files, etc. The signal path for an audio track maintains its channel configuration all the way from the input bus, via EQ, level and other Mixer settings to the output bus.

You specify the channel configuration for a track when you create it:

1. Select “Add Audio Track” from the track list context menu or the Project menu (or, if an audio track is already selected, double-click in an empty area of the track list). A dialog opens with a channel configuration pop-up menu.

2. Select the desired format from the pop-up menu.

The most common formats are listed directly on the pop-up menu, with the remaining surround formats listed on the “More...” submenu. For a list of the available surround formats, see [“Output bus configuration”](#) on [page 229](#).

- The Browse item in this dialog allows you to browse your disk(s) for created track presets, which can be used as a basis (or template) for tracks.

This is described in detail in the chapter [“Working with track presets”](#) on [page 356](#).

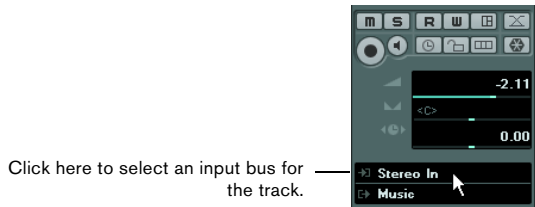
3. Click the Add Track button.

A track is added, set to the specified channel configuration. In the Mixer, a corresponding channel strip appears. You cannot change the channel configuration for a track.

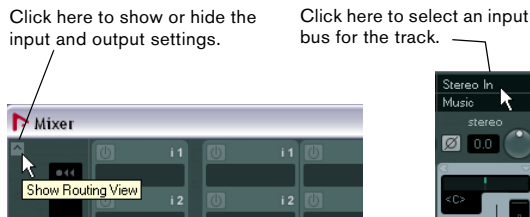
Selecting an input bus for a track

Here we assume that you have added and set up the required input busses (see [“Setting up busses”](#) on [page 28](#)). Before you record, you need to specify from which input bus the track will record. You can do this in the Inspector or in the Mixer.

- In the Inspector, you select an input bus on the Input Routing pop-up menu in the top section. As described in the section [“The Inspector”](#) on [page 41](#), the Inspector shows the settings for the selected track.



- In the Mixer, you select an input bus on the Input Routing pop-up menu at the top of the track's channel strip. If this pop-up menu is not shown, you need to open the Mixer Routing View by clicking the “Show Routing” button in the extended Mixer common panel or by selecting “Show Routing View” from the Window sub-menu of the Mixer context menu. See [“Configuring the Mixer”](#) on [page 154](#) for more information about the Mixer.



Recording from busses

You can also select an output bus, a group bus or an FX channel bus as an Input for your recording.

Let's assume you want to create a downmix of separate tracks, e.g. bass drum, hihats, snare, etc.

Proceed as follows:

1. Set up your separate tracks as desired and add a group track.
2. For each of the drum tracks, open the Output Routing pop-up menu and select the Group track as output.
3. Create a new audio track, open the Input Routing pop-up menu for it and select the Group track as input for this audio track.
4. Record enable this audio track and start recording.

Now, the output of the group track will be recorded on the new track and you will get a mix of your separate tracks.

⇒ You can also select an FX channel as recording source. In this case, only the output of the FX channel will be recorded.

For more information about the routing possibilities, see [“Routing”](#) on [page 168](#).

Selecting a folder for the recorded audio files

Each Nuendo project has a project folder containing (among other things) an “Audio” folder. By default, this is where recorded audio files are stored. However, you can select record folders independently for each audio track if needed.

Proceed as follows:

1. To select the same record folder for several audio tracks, select them by pressing [Shift] or [Ctrl]/[Command] and clicking on them in the track list.
2. Right-click the track list for one of the tracks to bring up the context menu.
3. Select “Set Record Folder”.
A file dialog opens.
4. Navigate to the desired folder (or create a new folder with the Create button).

Tip: if you want to have separate folders for different types of material (speech, ambient sounds, music, etc.), you can create subfolders within the project's “Audio” folder and assign different tracks to different subfolders. This way, all audio files will still reside within the project folder, which will make managing the Project easier.

- It is possible to have different tracks record to totally different locations, even on different disks. However, if you need to move or archive the project, there is a risk of missing some files. The solution is to use the “Prepare Archive” function in the Pool to gather all external files into the project folder first, see [“Prepare Archive”](#) on [page 332](#).

Setting input levels

When recording digital sound, it is important to set the input levels correctly – loud enough to ensure low noise and high audio quality, but not so loud that clipping (digital distortion) occurs.

Clipping typically occurs in the audio hardware when a too loud analog signal is converted to digital in the hardware's A/D converters.

- It is also possible to get clipping when the signal from the input bus is written to a file on your hard disk. This is because in Nuendo, you can make settings for the input bus, adding EQ, effects, etc. to the signal as it is being recorded. This may raise the level of the signal, causing clipping in the recorded audio file.

To check the level of the “unprocessed” signal coming into the audio hardware, you need to switch the level meters to “Meter Input”. In this mode, the input channel level meters will show the level of the signal at the input of the bus, before any adjustments such as input gain, EQ, effects, level or pan:

1. Right-click in the Mixer window to open the context menu.
2. Select the Global Meter Settings submenu and make sure that “Meter Input” is activated.
3. Play back the audio and check the level meter for the input channel.

The signal should be as loud as possible without exceeding 0dB (the Clipping indicator for the input bus should not light up).



The Clipping indicator

4. If necessary, adjust the input level in one of the following ways:
 - Adjust the output level of the sound source or external mixer.
 - Use the audio hardware's own application program to set the input levels (if possible). See the documentation for the audio hardware.

- If your audio hardware supports the ASIO Control Panel function, it may be possible to make input level settings. To open the ASIO control panel, open the Device Setup dialog via the Devices menu and, in the list to the left (below “VST Audio System”), select your audio card. When this is selected, you can open the Control Panel by clicking the Control Panel button in the settings section to the right.

The next step is to check the level of the audio being written to a file on your hard disk. This is only necessary if you have made any adjustments to the input channel (level settings, EQ, insert effects, etc.).

Also note the following:

- If you record in 32 bit float format, the bit resolution will not be reduced – which means there is no risk of clipping at this stage.

Also, this preserves the signal quality perfectly. Therefore, you should consider using 32 bit float format when you are recording with effects (see “Recording with effects” on page 101).

- If you record in 16 or 24 bit format, the available headroom is lower, which means clipping can occur if the signal is too loud. To avoid this, set the signal as described below.

1. Bring up the Mixer context menu, open and select Global Meter Settings “Meter Post-Fader”.
2. Set up the input channel, by adding EQ and/or effects. With some effects you may want to adjust the level of the signal going into the effect – use the Input Gain knob for this. Note that you need to press [Shift] or [Alt]/[Option] to adjust the Input Gain.



Adjusting the Input Gain.

3. Play back the audio and check the level meter of the input channel. The signal should be reasonably loud without exceeding 0dB (the Clipping indicator for the input bus should not light up).
4. If necessary, use the input channel fader to adjust the signal level.

Monitoring

In this context, “monitoring” means listening to the input signal during recording. There are three fundamentally different ways to do this: via Nuendo, externally (by listening to the signal before it reaches Nuendo), or by using ASIO Direct Monitoring (which is a combination of both other methods – see below).

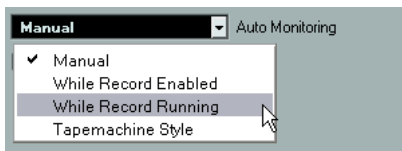
Monitoring via Nuendo

If you monitor via Nuendo, the input signal is mixed in with the audio playback. The advantage of this is that you can adjust the monitoring level and panning in the Mixer, and add effects and EQ to the monitor signal just as during playback (using the track’s channel strip – not the input bus!).

The disadvantage of monitoring via Nuendo is that the monitored signal will be delayed according to the latency value (which depends on your audio hardware and drivers). Therefore, monitoring via Nuendo requires an audio hardware configuration with a low latency value. You can check the latency of your hardware in the Device Setup dialog (VST Audio System page).

⇒ If you are using plug-in effects with large inherent delays, the automatic delay compensation function in Nuendo will increase the latency. If this is a problem, you can use the Constrain Delay Compensation function while recording, see “[Constrain Delay Compensation](#)” on [page 225](#).

When monitoring via Nuendo, you can select one of four Auto Monitoring modes in the Preferences dialog (VST page):



- **Manual**

This option allows you to turn input monitoring on or off by clicking the Monitor button in the Inspector, the track list or in the Mixer.

- **While Record Enabled**

With this option, you will hear the audio source connected to the channel input whenever the track is record enabled.

- **While Record Running**

This option switches to input monitoring only during recording.

- **Tapemachine Style**

This option emulates standard tapemachine behavior: input monitoring in Stop mode and during recording, but not during playback.

- In the Preferences dialog (VST–Metering page) you can find the “Map Input Bus Metering to Audio Track (in Direct Monitoring)” option.

When Direct Monitoring is activated in the Device Setup dialog, this option allows you to map the input bus metering to monitor-enabled audio tracks. This gives you the opportunity to watch the input levels of your audio tracks when working in the Project window.

When Direct Monitoring is activated in the Device Setup dialog, this function works as follows:

- When “Map Input Bus Metering to Audio Track (in Direct Monitoring)” is activated, audio tracks show the metering signal from the input bus they are routed to as soon as the track is record-enabled.

Note that the tracks are mirroring the input bus signal, i.e. you will see the same signal in both places. When using mapped metering, any functions (e.g. trimming) you apply to the audio track are not reflected in its meters.

- When “Map Input Bus Metering to Audio Track (in Direct Monitoring)” is not activated, metering works as usual.

External monitoring

External monitoring (listening to the input signal before it goes into Nuendo) requires some sort of external mixer for mixing the audio playback with the input signal. This can be a stand-alone physical mixer or a mixer application for your audio hardware, if this has a mode in which the input audio is sent back out again (usually called “Thru”, “Direct Thru” or similar).

When using external monitoring, you cannot control the level of the monitor signal from within Nuendo or add VST effects or EQ to the monitor signal. The latency value of the audio hardware configuration does not affect the monitor signal in this mode.

⇒ If you want to use external monitoring, you need to make sure that monitoring via Nuendo is not activated as well. Select the “Manual” monitoring mode in the Preferences dialog (VST page) and do not activate the Monitor buttons.

ASIO Direct Monitoring

If your audio hardware is ASIO 2.0 compatible, it may support ASIO Direct Monitoring (this feature may also be available for audio hardware with Mac OS X drivers). In this mode, the actual monitoring is done in the audio hardware, by sending the input signal back out again. However, monitoring is controlled from Nuendo. This means that the audio hardware's direct monitoring feature can be turned on or off automatically by Nuendo, just as when using internal monitoring.

- To activate ASIO Direct Monitoring, open the Device Setup dialog on the Devices menu and activate the Direct Monitoring checkbox on the page for your audio hardware. If the checkbox is grayed out, your audio hardware (or its driver) does not support ASIO Direct Monitoring. Consult the audio hardware manufacturer for details.

- When ASIO Direct Monitoring is activated, you can select a monitoring mode in the Preferences dialog (VST page), as when monitoring via Nuendo (see [“Monitoring via Nuendo”](#) on [page 97](#)).

- Depending on the audio hardware, it may also be possible to adjust the monitoring level and panning from the Mixer (including the Control Room section, but excluding the Talkback and External Return channels) by adjusting the volume faders, and the input gain controls and the send levels for Control Room studios.

Consult the documentation of the audio hardware if in doubt.

- VST effects and EQ cannot be applied to the monitor signal in this mode, since the monitor signal does not pass through Nuendo.

- Depending on the audio hardware, there may be special restrictions as to which audio outputs can be used for direct monitoring.

For details on the routing of the audio hardware, see its documentation.

The latency value of the audio hardware configuration does not affect the monitor signal when using ASIO Direct Monitoring.

When using Steinberg hardware (MR816 series) in combination with ASIO Direct Monitoring, monitoring will be virtually latency-free.

⇒ If you are using RME Audio Hammerfall DSP audio hardware, make sure that the pan law is set to -3dB in the card's preferences.

Recording

Recording is done using any of the general recording methods (see [“Basic recording methods”](#) on [page 91](#)). When you finish recording, an audio file is created in the Audio folder within the project folder. In the Pool, an audio clip is created for the audio file, and an audio event that plays the whole clip appears on the recording track. Finally, a waveform image is calculated for the audio event. If the recording was very long, this may take a while.

⇒ If the “Create Audio Images During Record” option is activated in the Preferences dialog (Record–Audio page), the waveform image will be calculated and displayed during the actual recording process. This realtime calculation uses some processing power – if your processor is slow or you are working on a CPU-intensive project, consider turning this option off.

Undoing recording

If you decide that you do not like what you just recorded, you can delete it by selecting Undo from the Edit menu. The following will happen:

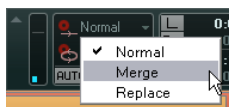
- The event(s) you just created will be removed from the Project window.
- The audio clip(s) in the Pool will be moved to the Trash folder.
- The recorded audio file(s) will not be removed from the hard disk.

However, since their corresponding clips are moved to the Trash folder, you can delete the files by opening the Pool and selecting “Empty Trash” from the Media menu, see [“Deleting from the hard disk”](#) on [page 326](#).

Recording overlapping events

The basic rule for audio tracks is that each track can play back a single audio event at a time. This means that if two or more events are overlapping, only one of them will be heard at any given time.

What happens when you record overlapping events (record in an area where there are already events on the track) depends on the Linear Record Mode setting on the Transport panel:



- In “Normal” or “Merge” mode, recording where something has already been recorded creates a new audio event that overlaps the previous one(s).

When you record audio, there is no difference between “Normal” and “Merge” mode – the difference only applies to MIDI recording (see [“About overlap and the Record Mode setting”](#) on [page 104](#)).

- In “Replace” mode, existing events (or portions of events) that are overlapped by the new recording will be removed.

This means that if you record a section in the middle of a longer existing recording, the original event will be cut into two events with a gap for the new event.

Which event will be heard?

If two or more events are overlapping, you will only hear the events (or portions of events) that are actually visible. Overlapped (hidden) events or sections are not played back.

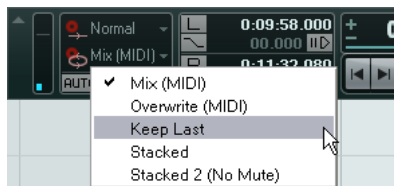
- The functions “Move to Front” and “Move to Back” on the Edit menu (Move submenu, see [“Moving events”](#) on [page 69](#)) are useful for managing overlapping events, as is the “To Front” function.

Recording audio in cycle mode

If you are recording audio in cycle mode, the result depends on two factors:

- The “Cycle Record Mode” setting on the Transport panel.
- The “Audio Cycle Record Mode” setting in the Preferences dialog (Record–Audio page).

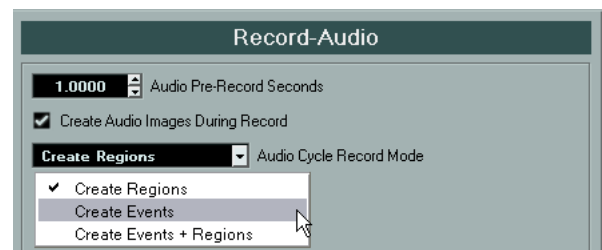
Cycle Record Modes on the Transport panel



There are five different modes on the Transport panel, but the first two modes only apply to MIDI recording. For audio cycle recording, the following applies:

- If “Keep Last” is selected, the last complete “take” (the last completely recorded lap) is kept as an audio event. In reality, all laps you recorded are saved in one audio file divided into regions – one region for each take. You can easily select a previous take for playback – this is done as when recording in “Create Regions” mode (see [“Create Regions mode \(Preferences\)”](#) on [page 100](#)).
- If “Stacked” is selected, each take will appear as an event on a separate “lane” on the track. This is useful when you want to view and edit the different takes and eventually combine them to one recording. In this mode, the Audio Cycle Record Mode preference does not matter. Stacked 2 (No Mute) is the same as Stacked, except that all the takes will be audible, see [“Recording audio in Stacked mode”](#) on [page 101](#).
- If any of the other cycle recording modes is selected, the result depends entirely on the “Audio Cycle Record Mode” setting in the Preferences dialog (Record–Audio page). These options are described below.

Create Events mode (Preferences)



When “Audio Cycle Record Mode” is set to “Create Events” in the Preferences dialog (Record–Audio page), the following will happen when you record audio in cycle mode:

- One continuous audio file is created during the entire recording process.
- For each recorded lap of the cycle, one audio event is created. The events will have the name of the audio file plus the text “Take **”, where “**” indicates the number of the take.
- The last take (the last recorded lap) will be on top (and will thus be the one you hear when you activate playback).

To select another take for playback, proceed as follows:

1. Holding [Alt]/[Option], right-click the event and select “To Front” on the context menu.

Whether a right click opens the context menu or the toolbox is determined by the “Popup Toolbox on Right Click” option in the Preferences dialog (Editing–Tools page). Depending on this setting the context menu is opened by right-clicking or by right-clicking holding any modifier key.



The “To Front” submenu, listing all the other (obscured) events.

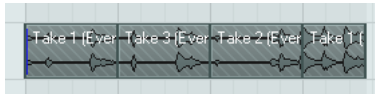
2. Select the desired take.

The corresponding event is brought to front.

This method allows you to quickly combine the best parts of each take, in the following way:

1. Use the Scissors tool to split the events in several sections, one for each part of the take.

For example, if you recorded four lines of vocals (in each take), you can split the events so that each line gets a separate event.



The events after splitting. Note that since the original take events overlap each other, clicking with the Scissors tool will split all takes at the same position.

2. For each section of the take, use the “To Front” function to bring the best take to the front.

This way, you can quickly combine the best sections of each take, using the first vocal line from one take, the second line from another take, and so on.

You can also compile a “perfect” take in the Audio Part Editor, see [“Assembling a “perfect take””](#) on [page 318](#).

Create Regions mode (Preferences)

When Audio Cycle Record Mode is set to “Create Regions” in the Preferences dialog (Record–Audio page), the following will happen when you record audio in cycle mode:

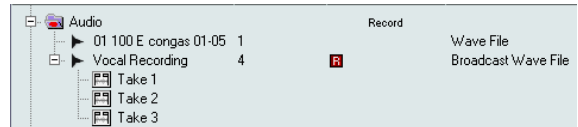
- One continuous audio file is created during the entire recording process.
- The audio event in the Project window shows the name of the audio file plus the text “Take **” (with “**” being the number of the last completed cycle lap).

- If you play back the recorded event, you will only hear what was recorded during the last lap of the cycle recording.

The previous “takes” recorded in the cycle are still available, however.

- The audio clip is divided into regions (called takes), one for each lap of the cycle that was recorded.

If you locate the audio file you just recorded in the Pool, and click on the “+” sign beside it, you can see the regions that have been created, one for each lap of the cycle that was completed during recording.



“Take” regions in the Pool window

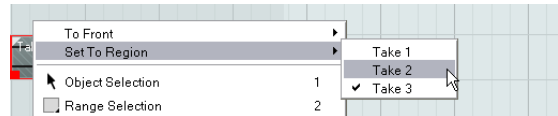
To play back the different “takes”, proceed as follows:

1. In the Project window, open the context menu for the event that was created during cycle recording.

2. Select the “Set To Region” menu item.

A submenu opens with the takes you recorded during cycle recording.

3. Now you can select any of the takes from the submenu and it will replace the previous take event in the Project window.



Use this method to listen through the various takes. Select the best single take, or compile a “perfect” take by cutting out the best bits from each take and putting them together (see [“Assembling a “perfect take””](#) on [page 318](#)).

Create Events + Regions mode (Preferences)

In this mode, both events and regions are created. If you work with the takes as events in this mode, you can edit the events freely (e.g. splitting them), see [“Create Events mode \(Preferences\)”](#) on [page 99](#). However, in case you want to go back to the original takes, they are still available as regions (on the “Set To Region” submenu, in the Pool or in the Sample Editor).

Recording audio in Stacked mode

When you record audio in cycle mode and the “Stacked” Cycle Record Mode is selected on the Transport panel, the following happens:

- Each complete recorded cycle lap is turned into a separate audio event.
- The track is divided into “lanes”, one for each cycle lap.
- The events are stacked above each other, each on a different lane.



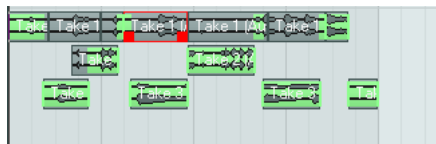
This makes it easy to create a “perfect take” by combining the best parts from the different cycle laps:

1. Zoom in so you can work comfortably with the stacked events.

If you play back the recorded section, only the lowest (last) take will be heard.

2. To audition another take, either mute the lower take(s) with the Mute tool or move the takes between the lanes. This can be done by dragging or by using the functions Move to Front/Back on the context menu or the Edit menu.

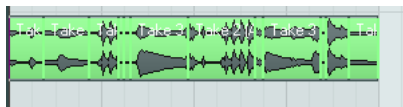
3. Edit the takes so that only the parts you want to keep can be heard.
You can cut events with the Scissors tool, resize them, mute them or delete them.



The sections that will be heard are indicated in green.

4. When you are satisfied with the result, select all events on all lanes and select “Delete Overlaps” from the Advanced submenu of the Audio menu.

This puts all events back on a single lane and resizes events so that overlapped sections are removed.



5. To turn off the lane display mode for the track, click the Lane Display Type button in the track list and select “Lanes Off”.

If the button is hidden, you can bring it to view in the Track Controls Settings dialog – see “Customizing track controls” on page 573.



The Lane Display Type button

Recording with effects

Normally you record the audio signals “dry” and add effects non-destructively during playback as described in the chapter “Audio effects” on page 195. However, Nuendo also allows you to add effects (and/or EQ) directly while recording. This is done by adding insert effects and/or making EQ settings for the input channel in the Mixer.

⇒ This will make the effects become part of the audio file itself – you cannot change the effect settings after recording.

About the record format

When you record with effects, consider setting the bit resolution to 32 Bit Float. This is done in the Project Setup dialog on the Project menu. Note that this is not required in any way – you can also record with effects in 24 or 16Bit format.

However, there are two advantages to 32 Bit Float format:

- With 32 Bit Float recording, you do not risk clipping (digital distortion) in the recorded files.

This can of course be avoided with 24 or 16 Bit recording as well, but requires more care with the levels.

- Nuendo processes audio internally in 32 Bit Float format – recording in the same format means the audio quality will be kept absolutely pristine.

The reason is that the effect processing in the input channel (as well as any level or EQ settings you make there) is done in 32 Bit Float format. If you record at 16 or 24 Bit, the audio will be converted to this lower resolution when it is written to file – with possible signal degradation as a result.

Note also that it does not matter at which actual resolution your audio hardware works. Even if the signal from the audio hardware is in 16 Bit resolution, the signal will be 32 Bit Float after the effects are added in the input channel.

An example

This example shows how to apply the “SoftClipper” effect while recording. Note that this is only an example. The principle is the same for all effects (or combinations of effects).

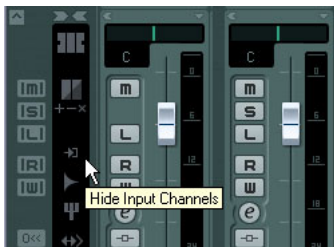
1. Set up an audio track for recording and select the desired input bus.

For best results, also activate monitoring as this allows you to hear and try out your settings before actually recording. See [“Monitoring via Nuendo”](#) on [page 97](#) for a description of monitoring via Nuendo.

2. Open the Mixer and make sure that the full extended view is shown.

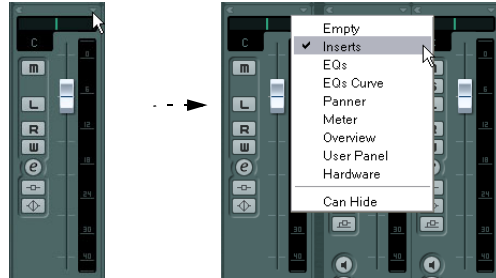
To show the extended Mixer view, either click the arrow icon (“Show Extended Mixer”) in the Common Panel, select “Show Extended View” from the Window submenu of the Mixer context menu or use a key command (this can be set in the Key Commands dialog, see [“Setting up key commands”](#) on [page 581](#)).

3. Locate the input channel (bus) from which you record. If the input channels are hidden, click on the Show/Hide Input Channels button to the left.



4. Check the input level (of the signal coming into the audio hardware) as described in the section [“Setting input levels”](#) on [page 96](#) and adjust the level of the source audio if necessary.

5. Pull down the View Options pop-up menu for the input channel and select “Inserts”.



The View Options pop-up menu is opened by clicking the arrow button between the fader panel and the extended panel.

Now the extended panel for the input channel shows the insert slots.

6. Click on an insert slot and select an effect from the context menu.

As you see, the included effects are sorted into submenus – you will find the SoftClipper effect on the “Distortion” submenu.

The effect is loaded and activated and its control panel is automatically opened.

7. Adjust the effect parameters to your liking.

For detailed information on the Effect parameters, see the separate PDF document “Plug-in Reference”.

8. When the effect is set up as desired, you can check the level of the input channel by setting the Meters to post-fader (see [“Setting input levels”](#) on [page 96](#)). Use the input channel fader to adjust the level if needed.

9. Activate recording.

10. When you’re finished, you can play back the recorded audio track.

As you can hear, the effect you applied is now a part of the actual audio file.

11. If you do not want to record more with the same plug-in, deactivate it by clicking in the insert slot and selecting “No Effect”.

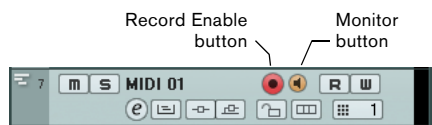
MIDI recording specifics

Activating MIDI Thru

Normally, when working with MIDI, you will have MIDI Thru activated in Nuendo, and Local Off selected in your MIDI instrument(s). In this mode, everything you play during recording will be “echoed” back out again on the MIDI output and channel selected for the recording track.

1. Make sure that the “MIDI Thru Active” option is activated in the Preferences dialog (MIDI page).
2. Record enable the track(s) on which you want to record.

Now, incoming MIDI is “echoed” back out again for all record-enabled MIDI tracks.



⇒ If you just want to use the Thru function for a MIDI track without recording, activate the monitor button for the track instead. This is useful, for instance, if you want to try out different sounds or play a VST instrument in realtime without recording your playing.

Setting MIDI channel, input, and output

Setting the MIDI channel in the instrument

Most MIDI synthesizers can play several sounds at the same time, each on a different MIDI channel. This is the key to playing back several sounds (bass, piano, etc.) from the same instrument. Some devices (such as General MIDI compatible sound modules) always receive on all 16 MIDI channels. If you have such an instrument, there is no specific setting you need to make in the instrument. On other instruments, you will have to use the front panel controls to set up a number of “Parts”, “Timbres” or similar so that they receive on one MIDI channel each. See the manual that came with your instrument for more information.

Naming MIDI ports in Nuendo

MIDI inputs and outputs are often displayed with unnecessarily long and complicated names. However, you can rename your MIDI ports to more descriptive names:

1. Open the Device Setup dialog from the Devices menu.
2. Select the MIDI Port Setup item in the Device list. The available MIDI inputs and outputs are listed. Under Windows, which device to choose depends on your system.
3. To change the name of a MIDI port, click in the “Show As” column and type in a new name. After closing the dialog, the new name will appear on the MIDI Input and Output Routing pop-up menus.

Setting the MIDI input in the Inspector

You select MIDI inputs for tracks in the Inspector (the area to the left of the track list in the Project window):

1. Select the track by clicking in the track list. To select multiple tracks, press [Shift] or [Ctrl]/[Command] and click. The Inspector shows the settings for the first selected track (for details, see “The Inspector” on page 41).
2. Click the track name in the Inspector to make sure that the topmost section is shown.



3. Pull down the Input Routing pop-up menu and select an input.

The available MIDI inputs are shown. The items on the menu depend on the type of MIDI interface you are using.

- If you select the “All MIDI Inputs” option, the track will receive MIDI data from all available MIDI inputs.
- If you hold down [Shift]-[Alt]/[Option] and select a MIDI input, this will be used for all selected MIDI tracks.

Setting the MIDI channel and output

The MIDI channel and output settings determine where the recorded MIDI is routed during playback, but are also relevant for MIDI Thru in Nuendo. Channel and output can be selected in the track list or in the Inspector. The procedure below describes how to make the settings in the Inspector, but it can be done in largely the same manner in the track list as well.

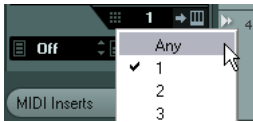
1. To select the track(s) and show the settings in the Inspector, proceed as when selecting a MIDI input (see above).

2. Pull down the Output Routing pop-up menu and select an output.

The available MIDI outputs are shown. The items on the menu depend on what type of MIDI interface you are using.

- If you hold down [Shift]-[Alt]/[Option] and select a MIDI output, this is selected for all selected MIDI tracks.

3. Use the Channel pop-up menu to select a MIDI channel for the track.



- If you set the track to MIDI channel “Any”, each MIDI event on the track will be sent out on the channel stored in the event itself.

In other words, the MIDI material will be played back on the channel(s) used by the MIDI input device (the MIDI instrument you play during recording).

Selecting a sound

You can select sounds from within Nuendo by instructing the program to send Program Change and Bank Select messages to your MIDI device. This is done using the “Patch Selector” and “Bank Selector” fields in the Inspector or track list.



Program Change messages give access to 128 different program locations. If your MIDI instruments have more than 128 programs, Bank Select messages (set in the “Bank Selector” field) allow you to select different banks, each containing 128 programs.

⇒ Bank Select messages are recognized differently by different MIDI instruments. The structure and numbering of banks and programs may also vary. Consult the documentation of your MIDI instruments for details.

⇒ Note that it is also possible to select sounds by name. For descriptions of how to set this up, see the separate PDF document “MIDI Devices”.

Recording

Recording MIDI is done according to the basic recording methods (see “[Basic recording methods](#)” on [page 91](#)). When you finish recording, a part containing MIDI events is created in the Project window.

About overlap and the Record Mode setting

MIDI tracks are different from audio tracks when it comes to overlapping parts:

⇒ All events in overlapping parts are always played back. If you record several parts at the same locations (or move parts so that they overlap), you will hear the events in all parts on playback, even though some of the parts are obscured in the Project window.

When recording overlapping parts, the result depends on the Linear Record Mode setting on the Transport panel:

- If the record mode is set to “Normal”, overdub recording works as with audio tracks, i.e. if you record again where something has already been recorded, you get a new part that overlaps the previous one(s).
- If the record mode is set to “Merge”, the overdubbed events are added to the existing part.
- If the record mode is set to “Replace”, the new recording replaces any existing events in the area on that track.

About punch in and out on MIDI tracks

Performing and setting up manual and automatic punch in/out recording for MIDI tracks is done in exactly the same way as for audio tracks. There is one thing to note, however:

- Punching in and out on recordings with pitchbend or controller data (modulation wheel, sustain pedal, volume, etc.) may lead to strange effects (apparently hanging notes, constant vibrato, etc.).

If this happens, you may need to use the Reset item on the MIDI menu (see [“The Reset function”](#) on [page 106](#)).

About the Automatic MIDI Record Quantize function

If Auto Quantize is activated on the Transport panel (the “Auto Q” button), the notes you record are automatically quantized according to the current Quantize settings. For more information about quantizing, see [“The quantizing functions”](#) on [page 392](#).

Recording MIDI in cycle mode

When you record MIDI in cycle mode, the result depends on which Cycle Record mode is selected on the Transport panel:

Cycle Record mode: Mix (MIDI)

For each completed lap, everything you record is added to what was previously recorded in the same part. This is useful for building up rhythm patterns, for example. Record a hi-hat part on the first lap, the bass drum part on the second lap, etc.

Cycle Record mode: Overwrite (MIDI)

As soon as you play a MIDI note (or send any MIDI message), all MIDI you have recorded on previous laps is overwritten from that point on in the part. An example:

1. You start recording in an eight bar cycle.
2. The first take was not good enough – you start directly with a new take on the next cycle lap and overwrite the first take.
3. After recording the second take you let the recording roll on and listen, without playing anything. You find that the take was good up until bar seven, for example.

4. On the next lap, you wait until bar seven and start playing.

This way you will overwrite the last two bars only.

5. Make sure that you stop playing before the next lap begins – otherwise you will overwrite the entire take.

Cycle Record mode: Keep Last

Each completed lap replaces the previously recorded lap. Note the following:

- The cycle lap must be completed – if you deactivate recording or press Stop before the cursor reaches the right locator, the previous take will be kept.
- If you do not play or input any MIDI during a lap, nothing happens (the previous take will be kept).

Cycle Record mode: Stacked/Stacked 2 (No Mute)

In this mode, the following happens:

- Each recorded cycle lap is turned into a separate MIDI part.
- The track is divided into “lanes”, one for each cycle lap.
- The parts are stacked above each other, each on a different lane.
- All takes but the last one are muted (Stacked).
- If Stacked 2 is selected, no muting takes place.



This makes it easy to create a “perfect take” by combining the best parts from the different cycle laps. You can edit the parts in the Project window (by cutting, resizing and deleting) or you can use a MIDI editor as in the following example:

1. Unmute the muted takes by clicking the parts with the Mute tool.
2. Select all takes (parts) and open them in the Key Editor for example.
3. Use the part list pop-up menu on the toolbar to select which part to edit. See [“Handling several parts”](#) on [page 405](#).
4. Remove or edit notes as desired.

5. When you are happy with the result, close the editor.
6. To turn it all into a single MIDI part (containing your “perfect take”), select all parts and select “Merge MIDI in Loop” from the MIDI menu.
7. In the dialog that opens, activate the Erase Destination option and click OK.
The remaining events in the parts are merged together into a single part.

Recording different types of MIDI messages

⚠ Use MIDI Filters to decide exactly which event types are recorded, see [“Filtering MIDI”](#) on [page 107](#).

Notes

When you press and release a key on your synth or other MIDI keyboard, a Note On (key down) and a Note Off (key up) message are sent out. The MIDI note message also contains the information which MIDI channel was used. Normally, this information is overridden by the MIDI channel setting for the track, but if you set the track to MIDI channel “Any”, the notes will be played back on their original channels.

Continuous messages

Pitchbend, aftertouch, and controllers (like modulation wheel, sustain pedal, volume, etc.) are considered as MIDI continuous events (as opposed to the momentary key down and key up messages). If you move the pitchbend wheel on your synthesizer while recording, this movement is recorded together with the key (Note On and Note Off messages), just as you’d expect. But the continuous messages can also be recorded after the notes have been recorded (or even before). They can also be recorded on their own tracks, separately from the notes to which they belong.

Say, for instance, that you record one or several bass parts on track 2. If you now set another track, like track 55, to the same output and MIDI channel as track 2, you can make a separate recording of just pitchbends for the bass parts on track 55. This means that you activate recording as usual and only move the pitchbend wheel during the take. As long as the two tracks are set to the same output and MIDI channel, it will appear to the MIDI instrument as if the two recordings were made at the same time.

Program Change messages

Normally, when you switch from one program to another on your keyboard (or whatever you use to record), a number corresponding to that program is sent out via MIDI as a Program Change message. These can be recorded on the fly with the music, recorded afterwards on a separate track, or manually entered in the Key or List Editors.

System Exclusive messages

System Exclusive (SysEx) is a special type of MIDI message used to send data that only makes sense to a unit of a certain make and type. SysEx can be used to transmit a list of the numbers that make up the settings of one or more sounds in a synth. For details about viewing and editing SysEx messages, see the section [“Working with SysEx messages”](#) on [page 427](#).

The Reset function

The Reset function on the MIDI menu sends out note-off messages and resets controllers on all MIDI channels. This is sometimes necessary if you experience hanging notes, constant vibrato, etc.

There are two other options to perform a reset:

- Nuendo can automatically perform a MIDI reset on stop. You can turn this function on or off in the Preferences dialog (MIDI page).
- Nuendo can automatically insert a reset event at the end of a recorded part.

Open the Preferences dialog (MIDI page) and activate the “Insert Reset Events after Record” option. The inserted Reset event will reset controller data such as Sustain, Aftertouch, Pitchbend, Modulation, Breath Control, etc. This is useful if a MIDI part is recorded and the Sustain pedal is still held after stopping recording. Usually, this would cause all following parts to be played with Sustain, as the Pedal Off command was not recorded. This can be prevented by activating “Insert Reset Events after Record”.

Retrospective Record

This feature allows you to capture any MIDI notes you play in Stop mode or during playback and turn them into a MIDI part “after the fact”. This is possible due to the fact that Nuendo can capture MIDI input in buffer memory, even when not recording.

Proceed as follows:

- 1. Enable the Retrospective Record option in the Preferences dialog (Record–MIDI page).

This activates the buffering of MIDI input, making Retrospective Record possible.

- 2. Make sure a MIDI track is record-enabled.

- 3. When you have played some MIDI material you want to capture (either in Stop mode or during playback), select Retrospective Record from the Transport menu (or use the key command, by default [Shift]-Num[*]).

The content of the MIDI buffer (i.e. what you just played) is turned into a MIDI part on the record enabled track. The part will appear where the project cursor was when you started playing – this means that if you played along during playback, the captured notes will end up exactly where you played them in relation to the project.

- The Retrospective Record Buffer Size setting in the Preferences dialog (Record–MIDI page) determines how much data can be captured.

MIDI Preferences

There are several other options and settings in the Preferences that affect MIDI recording and playback:

MIDI page

- Length Adjustment

Adjusts the length of notes so that there is always a short time between the end of one note and the start of another (of the same pitch and on the same MIDI channel). The time is set in ticks. By default there are 120 ticks per 1/16 note, but you can adjust this with the MIDI Display Resolution setting on the same page.

Record–MIDI page

- Snap MIDI Parts to Bars

When this is activated, recorded MIDI parts will automatically be lengthened to start and end at whole bar positions. If you are working in a Bars+Beats-based context, this can make editing (moving, duplicating, repeating, etc.) easier.

- Solo Record in MIDI Editors

If this is activated and you open a part for editing in a MIDI editor, its track is automatically record-enabled. Furthermore, Record Enable is deactivated for all other MIDI tracks until you close the editor again.

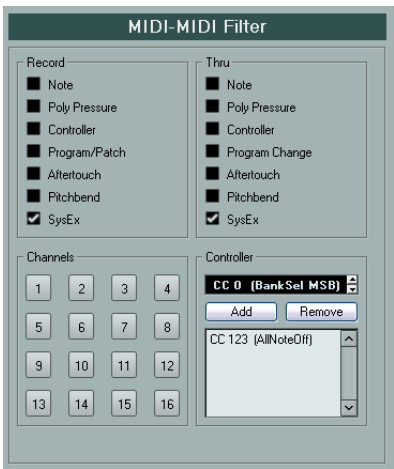
This makes it easier to record MIDI data when you’re editing a part – you will always be sure the recorded data ends up in the edited part and not on any other track.

- MIDI Record Catch Range in ms

When you record starting at the left locator, this setting helps you make sure that the very start of the recording is included. A very annoying scenario is when you have recorded a perfect MIDI take, only to find out that the very first note was not included – because you started playing a little bit too early! If you raise the Record Catch Range, Nuendo will catch the events played just before the recording start point, eliminating this problem.

For a description of the other options, click the Help button in the Preferences dialog.

Filtering MIDI



The MIDI–MIDI Filter page in the Preferences dialog allows you to prevent certain MIDI messages from being recorded and/or “thruput” (echoed by the MIDI Thru function).

The dialog is divided into four sections:

Section	Description
Record	Activating any of these options prevents that type of MIDI message from being recorded. It can, however, be thru-put, and if already recorded, it will play back normally.
Thru	Activating any of these options prevents that type of MIDI message from being thru-put. It can, however, be recorded and played back normally.

Section	Description
Channels	If you activate a channel button, no MIDI messages on that MIDI channel will be recorded or thruput. Already recorded messages will, however, be played back normally.
Controller	Allows you to prevent certain MIDI controller types from being recorded or thruput. To filter out a controller type, select it from the list at the top of the Controller section and click "Add". It will appear on the list below. To remove a controller type from the list (allow it to be recorded and thruput), select it in the lower list and click "Remove".

Options and Settings

Recording-related Transport Preferences

A couple of settings in the Preferences dialog (Transport page) are relevant for recording. Set these according to your preferred method of work:

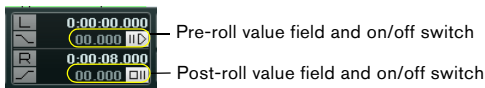
Deactivate Punch In on Stop

If this is activated, punch in on the Transport panel is automatically deactivated whenever you enter Stop mode.

Stop after Automatic Punch Out

If this is activated, playback will automatically stop after automatic punch out (when the project cursor reaches the right locator and punch out is activated on the Transport panel). If the post-roll value on the Transport panel is set to a value other than zero, playback will continue for the set time before stopping (see below).

About Pre-roll and Post-roll



The pre-roll and post-roll value fields (below the left/right locator fields) on the Transport panel have the following functionality:

- By setting a pre-roll value, you instruct Nuendo to “roll back” a short section whenever playback is activated. This applies whenever you start playback, but is perhaps most relevant when recording from the left locator (punch in activated on the Transport panel) as described below.

- By setting a post-roll value, you instruct Nuendo to play back a short section after automatic punch out before stopping.

This is only relevant when punch out is activated on the Transport panel and “Stop after Automatic Punch Out” is activated in the Preferences dialog (Transport page).

- To turn pre-roll or post-roll on or off, click the corresponding button on the Transport panel (next to the pre/post-roll value) or use the “Use Pre-roll” and “Use Post-roll” options on the Transport menu.

An example:

1. Set the locators to where you want to start and end recording.
2. Activate Punch in and Punch out on the Transport panel.
3. Activate the “Stop after Automatic Punch Out” option in the Preferences dialog (Transport page).
4. Set suitable pre-roll and post-roll times by clicking in the corresponding fields on the Transport panel and typing in time values.
5. Activate pre-roll and post-roll by clicking the buttons next to the pre-roll and post-roll times so that they light up.
6. Activate recording.

The project cursor “rolls back” by the time specified in the pre-roll field and playback starts. When the cursor reaches the left locator, recording is automatically activated. When the cursor reaches the right locator, recording is deactivated, but playback continues for the time set in the post-roll field before stopping.

Using the metronome

The metronome can output a click that can be used as a timing reference. The two parameters that govern the timing of the metronome are tempo and time signature, as set on the tempo track and signature track, or in the Tempo Track Editor (see “Editing the tempo curve” on page 455). The metronome can use a either an audio click played back via the audio hardware, send MIDI data to a connected device which will play back the click or both.

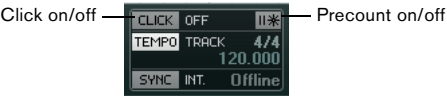
You can also set up a precount (count-in) that will be heard when you start recording from Stop mode. This can be musical or time based (see “Setting up a time-based count-in” on page 110).

- To activate the metronome click, activate the Click button on the Transport panel.

You can also select the “Metronome On” option on the Transport menu or use the corresponding key command (by default [C]).

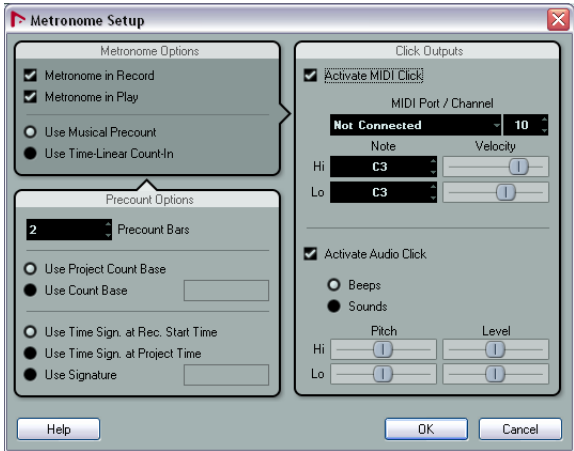
- To activate the precount, click the Precount button on the Transport panel.

You can also select the “Precount On” option on the Transport menu or set up a key command for this.



Metronome settings

You make settings for the metronome in the Metronome Setup dialog, opened from the Transport menu.



In the Metronome Options section, the following options are available:

Option	Description
Metronome in Record/Play	Allows you to specify whether the metronome is heard during playback, recording or both (when Click is activated on the Transport panel).
Use Musical Precount	Activates a musical count-in that is heard when you start recording from Stop mode.
Use Time-Linear Count-In	Activates a time-based count-in that is heard when you start recording from Stop mode.

If “Use Musical Precount” is selected, the following precount options are available:

Option	Description
Precount Bars	Sets the number of bars the metronome counts in before recording starts.
Use Project Count Base	If this option is activated, the metronome plays one click per beat according to the project count base.
Use Count Base	If this option is activated, a field appears to the right where you specify the “rhythm” of the metronome. For example, setting this to “1/8”, gives you eighth notes (two clicks per beat). It is also possible to create unusual metronome rhythms such as triplets.
Use Time Sign. at Rec. Start Time	When this is activated, the precount automatically uses the time signature and tempo set at the position where recording starts.
Use Time Sign. at Project Time	When this is activated, the precount uses the time signature set on the tempo track. Furthermore, any tempo changes on the tempo track during the precount are applied.
Use Signature	This lets you set a time signature for the precount. In this mode, tempo changes on the tempo track do not affect the precount.

If “Use Time-Linear Count-In” is selected, the following count-in options are available (see [“Setting up a time-based count-in”](#) on page 110 for details):

Option	Description
Count-In Clicks	In this field you can set the number of clicks you hear before playback or recording starts. You can set values from 1 to 20.
Interval in seconds	Use this field to define a time interval for the clicks (from 0.1 to 1.0 seconds). You can calculate the position of the first click by multiplying the Count-In Click value with the specified interval and subtracting this value from the position of the left locator.
Emphasis	Use this pop-up menu to select an emphasized click. This is useful if you want to have an audible difference between the first and/or last click and the other clicks.

Further configuration options for MIDI and audio clicks are available in the Click Outputs section:

Option	Description
Activate MIDI Click	Selects whether or not the metronome sounds via MIDI.
MIDI Port/Channel	This is where you select a MIDI output and channel for the metronome click. For the metronome click you can also select a VST instrument previously set up in the VST Instruments window.
Hi Note/Velocity	Sets the MIDI note number and velocity value for the “high note” (the first beat in a bar).

Option	Description
Lo Note/ Velocity	Sets the MIDI note number and velocity for the “low notes” (the other beats).
Activate Audio Click	Selects whether or not the metronome sounds via the audio hardware.
Beeps	When this is selected, the audio clicks will be beeps generated by the program. Adjust the pitch and level of the beeps for the “Hi” (first) beat and “Lo” (other) beats using the sliders below.
Sounds	When this is selected, you can click in the “Sound” fields below to load any audio files for the “Hi” and “Lo” metronome sounds. The sliders set the level of the click.

Setting up a time-based count-in

In postproduction scenarios projects are rather time based than referencing to bars and beats. In these cases it is useful to set up a time-linear count-in as a timing reference for your recordings.

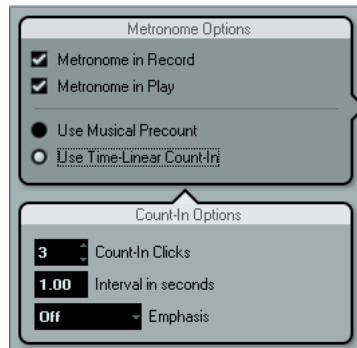
A typical use case would be the synchronization of voice-overs or dubbing versions. In these scenarios you find yourself frequently jumping to positions from which you want the recording to start. By setting the locators to the sections you want to record and defining a time-linear count-in, you can quickly assign, locate and hear the desired record start position in your project.

Proceed as follows:

1. On the Transport panel, activate the metronome click, set up a suitable pre-roll value and activate Pre-roll.
2. Open the Transport menu and make sure that the “Start Record at Left Locator” option is activated.
3. On the Transport menu, select “Metronome Setup...”. The Metronome Setup dialog opens.
4. In the Metronome Options section, make sure that the “Metronome in Record” option is activated.

5. Activate the “Use Time-Linear Count-In” option.

Options for the time-linear count-in are displayed in the “Count-In Options” section.



6. Set up the Count-In Options according to your needs.

7. Click OK to save your settings and close the Metronome dialog.

8. Set the locators to the section you want to record.

If you want to record several sections, it is useful to set up cycle markers for all sections that you want to record (see [“Cycle markers”](#) on [page 137](#)).

9. Activate recording.

Your project is played back from the current project cursor position. When the project cursor reaches the position specified with the “Count-In Clicks” and “Interval in seconds” parameters, the Count-In is triggered. It stops when the cursor reaches the left locator and recording starts.

- You can also set the left locator to the position where you want recording to start, set the project cursor to a position before the left locator, activate the Punch In button on the Transport panel and start playback.

The defined time-linear count-in is triggered as the project cursor moves towards the left locator. When it reaches the left locator, recording is automatically activated.

Lock and Unlock Record

During recording it can happen that you accidentally deactivate the record mode, e.g. by pressing [Space]. In order to prevent this, you can set up a key command for this in the Key Commands dialog. If you use the Lock Record key command, the Record button will turn gray and the record mode is locked until you use the Unlock Record key command or enter Stop mode.

- If Lock Record is activated and you want to enter Stop mode (by clicking Stop or pressing [Space]), you will see a dialog in which you need to confirm that you want to stop recording. You can also use the Unlock Record key command first and then enter Stop mode as usual.
 - By default, no key commands are assigned to these functions. In the Key Commands dialog, you will find the corresponding key command entries in the Transport category (see the chapter “[Key commands](#)” on [page 580](#) for more information on how to set up key commands).
- ⇒ These key commands are especially useful when combined with other commands (e.g. with Record/Stop) using the macro functions. That way you will receive powerful macros that can greatly enhance your workflow.
- ⇒ Note that an automatic punch-out at the right locator position that you may have set on the transport panel, will be ignored in Lock Record mode.

Record Time Max display

The Record Time Max display lets you see how much time you have left for recording. The available time depends on the current setup, for example, on the amount of tracks that are record-enabled, your project setup (e.g. the sample rate), and the amount of hard disk space available.

You can show and hide the display using the “Record Time Max” option on the Devices menu.

- ⇒ The remaining record time is also shown in the status line above the track list.

⚠ If you are storing your tracks on different drives (by using individual record folders), the time display refers to the medium with the least storage space available.

Recovery of audio recordings after system failure

Normally, when a computer crashes, all changes made to your current project since you last saved it will be lost. Usually, there is no quick and easy way to recover your work.

With Nuendo, when your system crashes while you are recording (because of a power cut or other mishap), you will find that your recording is still available, from the moment when you started recording to the time when your computer crashed.

When you experience a computer crash during a recording, simply relaunch the system and check the project record folder (by default this is the Audio subfolder inside the project folder). It should contain the audio file you were recording at the time of the crash.

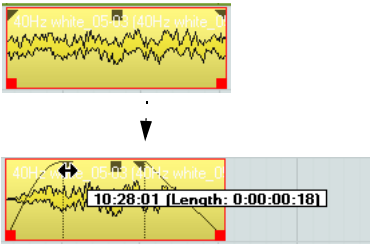
- ⚠ This feature does not constitute an “overall” guarantee by Steinberg. While the program itself was improved in such a way that audio recordings can be recovered after a system failure, it is always possible that a computer crash, power cut, etc. might have damaged another component of the computer, making it impossible to save or recover any of the data.
- ⚠ Please do not try to actively bring about this kind of situation to test this feature. Although the internal program processes have been improved to cope with such situations, Steinberg cannot guarantee that other parts of the computer are not damaged as a consequence.

Creating fades

There are two types of fade ins and fade outs in audio events in Nuendo: event-based fades that you create by using the fade handles (see below) and clip-based fades created by processing (see “[Clip-based fades](#)” on [page 114](#)).

Event-based fades

Selected audio events have triangular handles in the upper left and right corners. These can be dragged to create a fade in or fade out, respectively.



Creating a fade in. The fade is automatically reflected in the shape of the event's waveform, giving you a visual feedback of the result when dragging the fade handle.

Fades created with the handles are not applied to the audio clip as such but calculated in realtime during playback. This means that several events referring to the same audio clip can have different fade curves. It also means that having a large number of fades may require more processing power.

- If you select multiple events and drag the fade handles of one of them, the same fade is applied to all selected events.
- A fade can be edited in the Fade dialog, as described on the following pages.

You open the dialog by double-clicking in the area above the fade curve, or by selecting the event and selecting “Open Fade Editor(s)” from the Audio menu (note that this will open two dialogs if the event has both fade in and fade out curves).

If you adjust the shape of the fade curve in the Fade dialog, this shape will be maintained when you later adjust the length of the fade.

- You can make the fade longer or shorter at any time, by dragging the handle.

You can do this without selecting the event first, i.e. without visible handles. Just move the mouse pointer along the fade curve until the cursor turns into a bidirectional arrow, then click and drag.

- If the “Show Event Volume Curves Always” option is activated in the Preferences dialog (Event Display–Audio page), fade curves are shown in all events, regardless of whether they are selected or not.

If the option is deactivated, the fade curves are shown in selected events only.

- If the “Thick Fade Lines” option is activated in the Preferences dialog (Event Display–Audio page), the fade lines and volume curve are thicker, increasing their visibility.

- If the “Use Mouse Wheel for Event volume and Fades” option is activated in the Preferences dialog (Editing–Audio page), pressing [Shift] while moving the mouse wheel moves the volume curve up or down.

When you position the mouse pointer somewhere in the left half of the event, the fade in end point is moved. When the mouse pointer is in the right half of the event, the fade out start point is moved.

⇒ In the Key Commands dialog (Audio category) you can set up key commands for changing the event volume curve and any fade curves, see “[Key commands](#)” on [page 580](#).

⇒ As an alternative to dragging the fade handles, you can use the “Fade In to Cursor” and “Fade Out to Cursor” options on the Audio menu to create fades. Position the project cursor on an audio event where you want a fade in to end or a fade out to begin, and select the appropriate option from the Audio menu. A fade will then be created, ranging from the event's start or end to the position of the cursor.

Creating and adjusting fades with the Range Selection tool



Event-based fades can also be created and adjusted with the Range Selection tool:

1. Select a section of the audio event with the Range Selection tool.
2. Pull down the Audio menu and select “Adjust Fades to Range”.

The result depends on your selection:

- If you select a range from the beginning of the event, a fade in is created within the range.
- If you select a range that reaches the end of an event, a fade out is created in the range.
- If you select a range encompassing a middle section of the event, but not reaching neither the start nor the end, a fade in is created from the beginning of the event to the beginning of the selected range, and a fade out is created from the end of the selected range to the end of the event.

⚠ You can select multiple audio events on separate tracks with the Range Selection tool, and apply the fade to all of them simultaneously.

Applying default fades

You can also create fades by using the “Apply Standard Fade In” and “Apply Standard Fade Out” commands from the Audio menu.

1. Select one or more audio events in the Project window.
2. On the Audio menu, select “Apply Standard Fade In” or “Apply Standard Fade Out”.

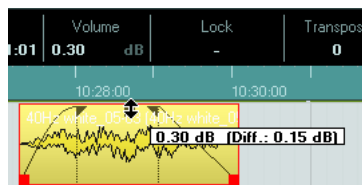
A fade of the same length and shape as the default fade is created (see “As Default button” on [page 115](#)).

About the volume handle

A selected audio event also has a square handle in the top middle: the volume handle. It provides a quick way of changing the volume of an event in the Project window. Note that dragging the volume handle also changes the value on the info line.

The volume change is displayed numerically in the info line.

Drag the Volume handle up or down to change the volume of the event.



The event waveform reflects the volume change.

Removing fades

To remove the fades for an event, select the event and select “Remove Fades” from the Audio menu.

If you want to remove the fades in a specific range only, select the fade area with the Range Selection tool and select “Remove Fades” from the Audio menu.

Clip-based fades

If you have selected an audio event or a section of an audio event (using the Range Selection tool), you can apply a fade in or fade out to the selection by using the “Fade In” or “Fade Out” function on the Process submenu of the Audio menu. These functions open the corresponding Fade dialog, allowing you to specify a fade curve. Fades created this way are applied to the audio clip rather than to the event.

Please note the following:

⚠ The length of the fade area is determined by your selection. In other words, you specify the length of the fade before you open the Fade dialog. You can select multiple events and apply the same processing to all of them simultaneously.

- If you later create new events that refer to the same clip, these will have the same fades.
- You can remove or modify the fades at any time using the Offline Process History (see “[The Offline Process History dialog](#)” on [page 275](#)).

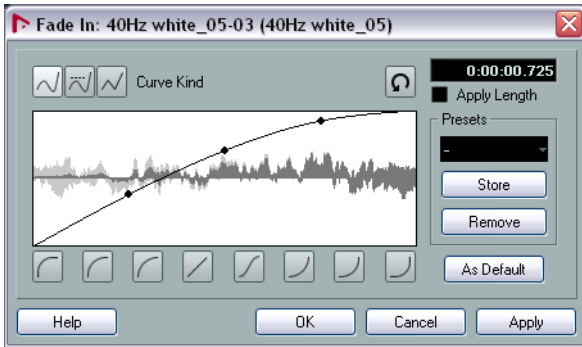
If other events refer to the same audio clip, you will be asked whether you want the processing to be applied to these events or not.

- Continue will apply the processing to all events that refer to the audio clip.
- New Version will create a separate, new version of the audio clip for the selected event.
- You can also activate the “Please, don’t ask again” option. Regardless of whether you then choose “Continue” or “New Version”, any further processing will conform to the option you select.

You can change this setting at any time in the Preferences dialog (Editing-Audio page), under “On Processing Shared Clips”.

The Fade dialogs

The Fade dialogs appear when you edit an existing fade or use the Fade In/Fade Out functions on the Process sub-menu of the Audio menu. The picture below shows the Fade In dialog; the Fade Out dialog has identical settings and features.



If you open the Fade dialog(s) with several events selected, you can adjust the fade curves for all these events at the same time. This is useful if you want to apply the same type of fade in to more than one event, etc.

The available options are:

Option	Description
Curve Kind	These buttons determine whether the fade curve consists of spline curve segments (left button), damped spline segments (middle button), or linear segments (right button).
Fade display	This shows the shape of the fade curve. The resulting waveform shape is shown in dark gray, with the current waveform shape in light gray. Click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.
Curve shape buttons	These buttons give you quick access to some common curve shapes.
Restore button	This button is only available when editing fades made by dragging the fade handles. Click this to cancel any changes you have made since opening the dialog.

Option	Description
Fade Length Value	<p>This parameter is only available when editing fades made by dragging the fade handles. It can be used to enter fade lengths numerically. The format of values displayed here is determined by the Primary Time Display in the Transport panel.</p> <p>When you activate the Apply Length option, the value entered in the Fade Length value field is used when clicking Apply or OK.</p> <p>When you set the current fade as the default fade, the length value is included as part of the default settings.</p>
Presets	<p>In this section you can set up presets for fade in or fade out curves that you want to apply to other events or clips.</p> <p>To apply a stored preset, select it from the pop-up menu.</p> <p>To rename the selected preset, double-click on the name and type in a new one.</p> <p>To remove a stored preset, select it from the pop-up menu and click Remove.</p>
As Default button	<p>This button is only available when editing fades made by dragging the fade handles. Click this to store the current settings as the default fade, to be used whenever you create new fades by dragging event handles. Both the shape and length will be used when you create fades using the "Apply Standard Fade..." command from the Audio menu.</p>

Applying a fade

Depending on whether you are editing a fade made with the fade handles or applying a fade using processing, different buttons are shown in the bottom row of the Fade dialog.

The Edit Fade dialogs have the following buttons:

Button	Function
OK	Applies the set fade curve to the event, and closes the dialog.
Cancel	Closes the dialog without applying any fade.
Apply	Applies the set fade curve to the event, without closing the dialog.

The Process Fade dialogs have the following buttons:

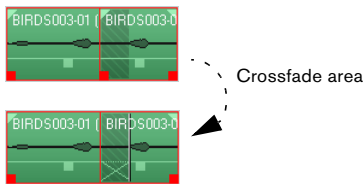
Button	Function
Preview	Plays back the fade area. Playback will repeat until you click the button again (the button is labeled "Stop" during playback).
Process	Applies the set fade curve to the clip, and closes the dialog.
Cancel	Closes the dialog without applying any fade.

Creating crossfades

Overlapping audio material on the same track can be crossfaded, for smooth transitions or special effects. You create a crossfade by selecting two consecutive audio events and selecting the Crossfade command on the Audio menu (or by using the corresponding key command, by default [X]). The result depends on whether the two events overlap or not:

- If the events overlap, a crossfade is created in the overlapping area.

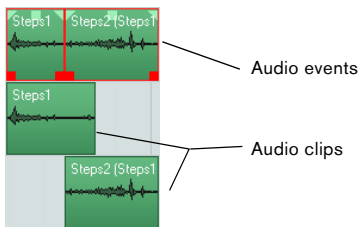
The crossfade will be of the default shape (linear, symmetric), but you can change this as described below.



⇒ The default crossfade length and shape are set in the Crossfade dialog (see [“As Default button”](#) on [page 115](#)).

- If the events do not overlap but are directly consecutive (lined up end-to-start, with no gap) it is still possible to crossfade them – provided that their respective audio clips overlap! In this case, the two events are resized so that they overlap, and a crossfade of the default length and shape is applied.

An example:



The events themselves do not overlap, but their clips do. Therefore, the events can be resized so that they overlap, which is required for a crossfade.



When you apply the Crossfade function, the two events are resized so that they overlap, and a default crossfade is created in the crossfade area.

- If the events do not overlap and cannot be resized enough to overlap, a crossfade cannot be created.
- You can specify the length of the crossfade using the Range Selection tool: make a selection range covering the desired crossfade area and use the Crossfade command on the Audio menu.

The crossfade is applied to the selected range (provided that the events or their clips overlap, as described above).

⇒ You can also make a selection range after creating the crossfade and use the function “Adjust fades to Range” on the Audio menu.

- Once you have created a crossfade, you can edit it by selecting one or both crossfaded events, and selecting “Crossfade” from the Audio menu again (or by double-clicking in the crossfade zone).

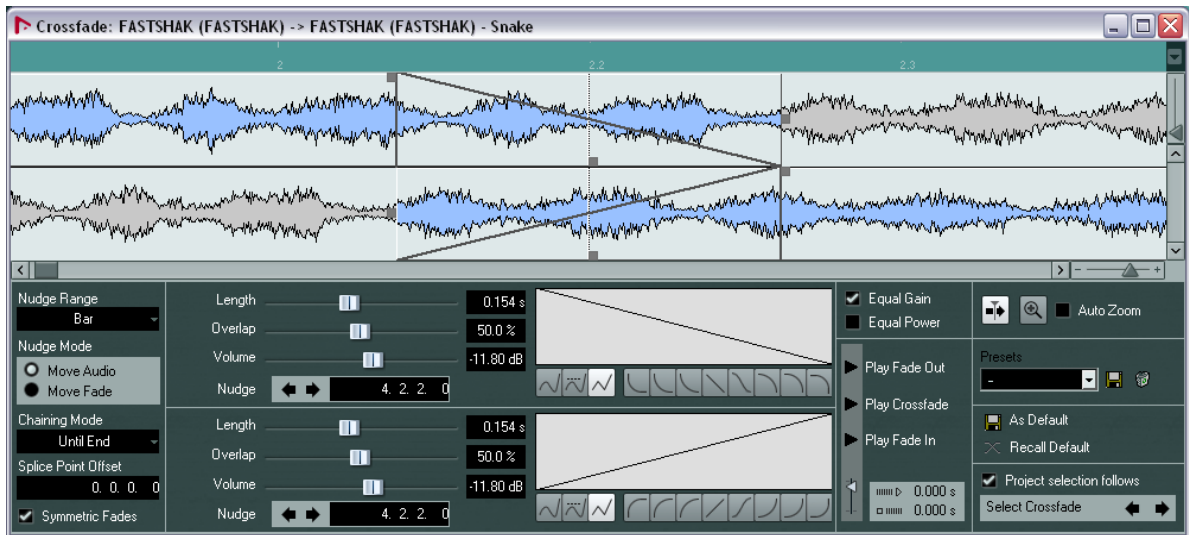
This opens the Crossfade dialog, see below.

Removing crossfades

To remove a crossfade, proceed as follows:

- Select the corresponding events and select “Remove Fades” from the Audio menu.
- Use the Range Selection tool to select all fades and crossfades you wish to remove, and select “Remove Fades” from the Audio menu.
- Select a crossfade by clicking and drag it outside the track.

The Crossfade dialog





⇒ This section describes the default Crossfade dialog. However, if you activate the “Simple Crossfade Editor” option in the Preferences dialog (Editing–Audio page), a simplified dialog is used instead (similar to the regular Fade dialogs).

Options and settings

The Crossfade dialog consists of two sections: The waveforms of the audio to be crossfaded and the fade curves are displayed at the top. The lower half of the Crossfade dialog contains a number of common settings and controls, as well as separate (but identical) settings for the fade out (top) and the fade in curve (bottom) of the crossfade. The following options are available (from left to right):

Option	Description
Nudge Range	This pop-up menu lets you specify the range that is moved when using the Nudge buttons, see “ Using the Nudge buttons ” on page 119 .
Nudge Mode	Here, you can specify whether you want the fade or the audio to move when you use the Nudge buttons, see “ Using the Nudge buttons ” on page 119 .

Option	Description
Chaining Mode	<p>This setting determines how the audio to the right of the crossfade on the track behaves when you move the crossfade for an event. Note that the behavior is different depending on whether the next audio event on the track follows seamlessly or with a gap:</p> <ul style="list-style-type: none">Until End – all following events on the track are moved.Until Gap – all following events on the track up to the next gap are moved.None – none of the following events on the track are moved.
Splice Point Offset	<p>In the fade in and fade out curves you can see a dotted vertical line that marks the splice point. If you work with asymmetric crossfades, you can set different splice points for the fade in and the fade out events, i.e. a splice point offset. For further information about the splice point, see "Changing the overlap" on page 118.</p>
Symmetric Fades	<p>If this is activated, the editing controls of the fade out and fade in curves become "linked", so that both fade curves are affected by the same amount, regardless of whether you use the fade out or fade in controls.</p>
Length	<p>This specifies the length of the crossfade area, see "Resizing the crossfade area" on page 119.</p>
Overlap	<p>This defines the position of the splice point in the crossfade area, see "Changing the overlap" on page 118.</p>

Option	Description
Volume	This changes the volume of the crossfaded events. This is the same as using the volume handles in the event display, see “About the volume handle” on page 114 .
Nudge buttons	Use the Nudge buttons to nudge the fade area or the audio in the desired direction, see “Using the Nudge buttons” on page 119 .
Fade curve displays	These displays show the shape of the fade out and fade in curve, respectively. Click on a curve to add points, click and drag existing points to change their shape, or drag a point outside the display to remove it.
Curve buttons	<p>The curve kind buttons determine whether the corresponding fade curve consists of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).</p>  <p>The curve shape buttons give you quick access to some common curve shapes.</p> 
Equal Gain	Activate this parameter to adjust the fade curves so that the summed fade in and fade out amplitudes will be the same all along the crossfade region. This is often suitable for short crossfades.
Equal Power	Activate this parameter to adjust the fade curves so that the energy (power) of the crossfade will be constant all along the crossfade region.
Play buttons	<p>These buttons allow you to audition the whole crossfade, or the fade out part, or the fade in part. You can set up key commands for this in the following categories of the Key Commands dialog: Crossfade Editor category – Play Fade Out, Play Crossfade, Play Fade In.</p> <p>Media category – Preview Start (triggers crossfade playback), Preview Stop (stops crossfade playback).</p> <p>Transport category – StartStop (triggers global playback), Stop (stops global playback) and Start-Stop Preview (triggers crossfade playback).</p> <p>For further information, see “Key commands” on page 580.</p>
Pre-roll and Post-roll	<p>Activate pre-roll to start playback before the fade area. Activate post-roll to stop playback after the fade area.</p> <p>In the time fields you can enter the desired time (in seconds and milliseconds) for the pre-roll and post-roll length.</p>
Auto-Scroll button	Activate this to scroll the crossfade display during playback, so that the position cursor is always visible. This only applies when using the Transport play controls and works like the corresponding function in the Project window (see “Auto-Scroll” on page 50).
Zoom to Fade button	Click on this button to zoom and center the display on the currently selected crossfade area.

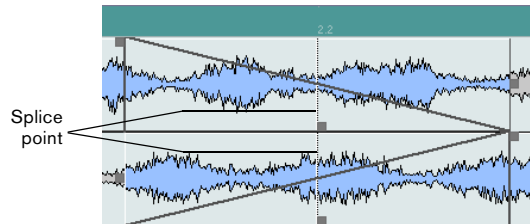
Option	Description
Auto Zoom	Activate this to zoom and center the display automatically on the current crossfade when you resize it. This also works when you select the next crossfade with the “Select Crossfade” buttons (see below).
Presets section	<p>Click the Store button to the right of the Presets pop-up menu to store the settings of your crossfade so that you can apply them to other events later.</p> <p>To rename a preset, double-click on the name and type in a new one.</p> <p>To remove a preset, select it on the pop-up menu and click the Delete button.</p>
Default buttons	<p>Click the As Default button to store the current settings as default. These settings will then be used whenever you create new crossfades.</p> <p>Click the Recall Default button to apply the curves and settings of the default crossfade to the Crossfade dialog.</p>
Select Crossfade buttons	<p>These buttons allow you to select the previous/next crossfade area, provided that the current track contains more than one crossfade.</p> <p>If “Project selection follows” is activated, selecting another crossfade will automatically change the event selection in the Project window.</p>

Moving the crossfade area

You can move the crossfade area in the crossfade display by changing the overlap or the nudge parameters. This is described in the following sections.

Changing the overlap

The overlap value is the relation between the splice point (i.e. the intersection point of the two events, see the picture below) and the crossfade area. If you use the Overlap controls, the crossfade will be moved around the splice point. By default, the splice point is situated in the center of the crossfade area.



A centered symmetric crossfade

For symmetric crossfades, the splice point for the fade out and the fade in is initially situated in the center of the crossfade. By moving the overlap sliders, you can move the crossfade around the splice point to determine how much of the fade out and how much of the fade in event are included.

For asymmetric crossfades you can move the overlap sliders separately to set up different overlap values for the fade in and fade out curves. This results in a Splice Point Offset.

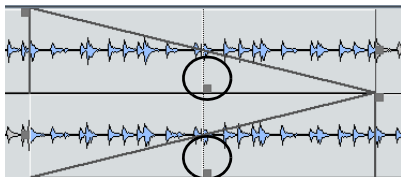


Do not mistake the Overlap parameter for the length of the crossfade area of the events.

Using the Nudge buttons

When you use the Nudge buttons, you can decide whether they move the fade area or the audio clip. To do this, activate either “Move Audio” or “Move Fade” in the Nudge Mode section. Each time you click a Nudge button or change the value in the nudge field, the fade area or audio clip is moved in the corresponding direction by the amount specified on the Nudge Range pop-up menu.

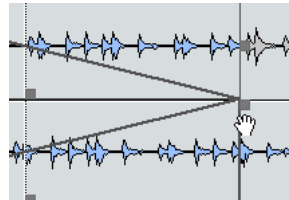
- If “Symmetric Fades” is activated and the Nudge Mode is set to “Move Fade”, both the fade out area and the fade in area will be moved by the same amount. You can also move the fade by using the middle handle of the fade out or the fade in curve.



Moving the Fade

- If “Symmetric Fades” is activated and the Nudge Mode is set to “Move Audio”, the Nudge buttons in the fade in display will move the audio event.

You can also move the audio by clicking on the fade in event and dragging with the hand symbol that appears.



Moving the audio

- ⇒ It is not possible to move the audio of the fade out event.

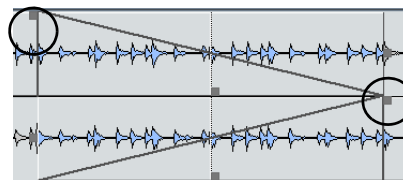
Resizing the crossfade area



To be able to resize a crossfade, it must be possible to resize the corresponding event. For example, if the fade out event already plays its audio clip to the end, its end point cannot be moved any further to the right.

Changing the crossfade length without moving the splice points

You can adjust the length of the crossfade area by using the Length sliders, by clicking in the “Length” fields, by changing the value numerically and pressing [Return], or by moving the corresponding handles in the crossfade display:



Click and drag these points to change the length of the fade out or the fade in curve.

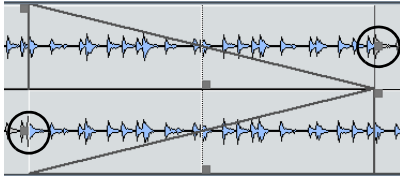
- If “Symmetric Fades” is activated when you change the length, both the fade out and the fade in length are changed by the same amount.

The length change will be applied equally to both sides, without moving the splice points.

- If “Symmetric Fades” is deactivated, the upper Length controls change the length of the fade out curve, and the lower controls change the length of the fade in curve.

Changing the crossfade length and moving the splice points

You can also adjust the length of the crossfade area by using the right handle of the fade out or the left handle of the fade in curve. This will change the length together with the splice points:



Click and drag these handles to change the length of the fade out or the fade in curve together with the splice points.

- If “Symmetric Fades” is activated, the length and splice points of both the fade out curve and the fade in curve are changed.
- If “Symmetric Fades” is deactivated, the right handle of the fade out curve changes the length and splice point of the fade out curve, and the left handle of the fade in curve changes the length and splice point of the fade in curve.

Auto fades and crossfades

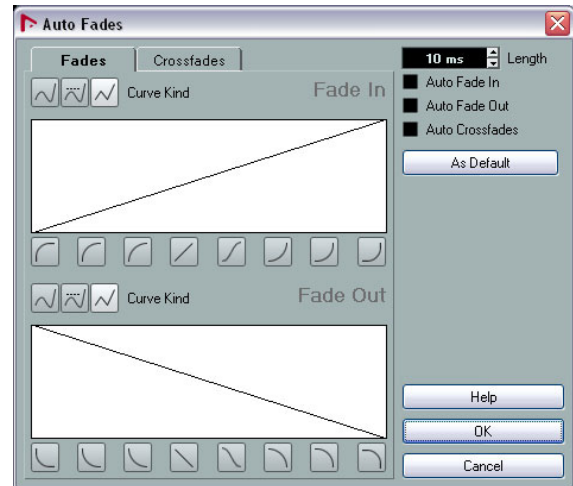
Nuendo features an Auto Fade function that can be set both globally, and separately for each audio track. The idea behind the Auto Fade function is to create smoother transitions between events by applying short (1–500ms) fade ins and fade outs.

⚠ As mentioned earlier, event-based fades are calculated in realtime during playback. Therefore, the more audio events there are in a project, the higher the demand on the processor when Auto Fades is activated.

⇒ Auto fades are not indicated by fade lines!

Making global Auto Fade settings

1. To make Auto Fades settings globally for a project, select “Auto Fades Settings...” from the Project menu. This opens the Auto Fades dialog for the project.



2. Use the Length value field to specify the length of the Auto Fades or Crossfades (1–500ms).
3. Use the checkboxes in the upper right corner to activate or deactivate Auto Fade In, Auto Fade Out, and Auto Crossfades.
4. To adjust the shapes of Auto Fade In and Auto Fade Out, select the Fades tab and make settings as in the regular Fade dialogs (see [“The Fade dialogs”](#) on [page 115](#)).
5. To adjust the shape of the Auto Crossfade, select the “Crossfades” tab and make settings as in the regular Crossfade dialog (see [“The Crossfade dialog”](#) on [page 117](#)).
6. If you want to use your settings in future projects, click the “As Default” button.
7. Click OK to close the dialog.

Making Auto Fade settings for individual tracks

By default, all audio tracks will use the settings you have made in the project's Auto Fades dialog. However, since Auto Fades use computing power, a better approach may be to turn Auto Fades off globally and activate them for individual tracks, as needed:

1. Right-click the track in the track list and select "Auto Fades Settings..." from the context menu (or select the track and click the "Auto Fades Settings" button in the Inspector).

The Auto Fades dialog for the track opens. This is identical to the project's Auto Fades dialog, with the addition of a "Use Project Settings" option.

2. Deactivate the "Use Project Settings" option.
Any settings you now make are applied to the track only.
3. Set up the Auto Fades as desired and close the dialog.

Reverting to project settings

If you want a track with individual Auto Fade settings to use the global Auto Fade settings, open the Auto Fades dialog for the track and activate the "Use Project Settings" checkbox.

Event envelopes

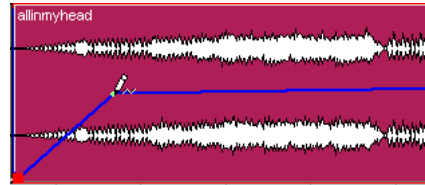
An envelope is a volume curve for an audio event. It is similar to the realtime fades, but allows you to create volume changes within the event, not only at the start or end.

To create an envelope for an audio event, proceed as follows:

1. Zoom in on the event so that you can view its waveform properly.
2. Select the Pencil tool.
When you move the Pencil tool over an audio event, a small volume curve symbol is shown next to the tool.

3. To add an envelope point, click in the event with the Pencil tool.

An envelope curve and a curve point appear.



4. Drag the curve point to adjust the envelope shape.

The waveform image reflects the volume curve.

- You can add as many curve points as you like.
- To remove a curve point from the envelope, click on it and drag it outside the event.
- The envelope curve is a part of the audio event – it will follow when you move or copy the event.
After copying an event with an envelope, you can make independent adjustments to the envelopes in the original event and the copy.
⇒ It is also possible to apply an envelope to the audio clip using the Envelope function on the Process submenu of the Audio menu (see "Envelope" on [page 266](#)).
- To remove an event envelope curve from a selected event, open the Audio menu and select the Remove Volume Curve option.

Introduction

The arranger track allows you to work with sections of your project in a non-linear fashion, to simplify arranging to the maximum extent. Instead of moving, copying and pasting events in the Project window to create a linear project, you can define how different sections are to be played back, like a playlist.

For this, you can define arranger events, order them in a list, and add repeats as desired. This offers a different and more pattern-oriented way of working, which complements the usual linear editing methods in the Project window.

You can create several arranger chains, making it possible to store different versions of a song within the project without sacrificing the original version. When you have created an arranger chain that you like, you have the option of “flattening” the list, which creates a normal linear project based on the arranger chain.

You can also use the arranger track for live performances on the stage, in clubs or at parties.

Setting up the arranger track

Let’s say you have prepared a number of audio files that form the base of a typical pop song, with introduction, verse, chorus and bridge. Now you want to arrange these files.

The first step is to create an arranger track. On the arranger track, you define specific sections of the project by creating arranger events. These can be of any length, may overlap and are not bound to the start or end of existing events and parts. Proceed as follows:

1. Open the project for which you want to create arranger events.
2. Open the Project menu and select Arranger from the Add Track submenu (or right-click the track list and select the corresponding option from the context menu).
An arranger track is added. There can be only one arranger track in a project, but you can set up more than one arranger chain for this track, see “Managing arranger chains” on [page 125](#).

3. On the Project window toolbar, make sure that Snap is activated and that the Snap Type is set to a mode that allows your arranger events to snap to appropriate positions in the project.



Snap to events is activated, i.e. when drawing in the Project window, new events will snap to existing events.

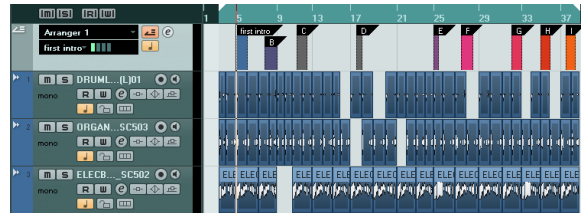
4. On the arranger track, use the Pencil tool to draw an event of the desired length.

An arranger event is added, called “A” by default. Any following events will be named in alphabetical order.

- You can rename an arranger event by selecting it and changing its name in the Project window info line or by holding down [Alt]/[Option], double-clicking on the name in the arranger chain (see below) and entering a new name.

You may want to name your arranger events according to the structure of your project, e.g. Verse, Chorus, etc.

5. Create as many events as you need for your project.



When arranger events have been created, the music sequence is determined by the arranger events.

Events can be moved, resized and deleted using the standard techniques. Please note:

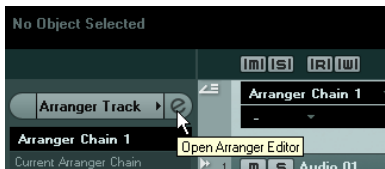
- If you want to change the length of an event, select the Arrow tool and click and drag the lower corners of the event in the desired direction.
- If you copy an arranger event (by [Alt]/[Option]-dragging or by using copy/paste), a new event will be created with the same name as the original.
However, this new event will be totally independent from the original event.
- Double-clicking on an arranger event adds it to the current arranger chain.

Working with arranger events

You now have a number of arranger events that form the basic building blocks for your arrangement. The next step is to arrange these events using the functions of the Arranger Editor.

Creating an arranger chain

You can set up an arranger chain in the Arranger Editor or in the Inspector for the arranger track. The Arranger Editor is opened by clicking the “e” button in the Inspector or in the track list.



Click the “e” button...

...to open the Arranger Editor.

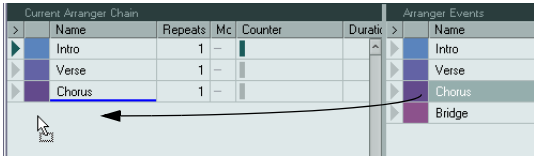


On the right in the Arranger Editor, the available arranger events are listed, in the order they appear on the time line. To the left you find the actual arranger chain, which shows in which order the events will be played back, from top to bottom, and how many times they are repeated.

Initially the arranger chain is empty – you set it up by adding events from the list to the chain. There are several ways to add events to the arranger chain:

- By double-clicking on the name of an event in the window section on the right (or in the Project window). When an event is selected in the arranger chain on the left, this will add the event above the selected event. When no events are selected in the arranger chain, the event will be added at the end of the list.
- By selecting one or more events in the list, right-clicking and selecting “Append Selected In Arranger Chain”. This will add the selected events at the end of the list.

- By dragging and dropping arranger events from the list on the right to the arranger chain on the left. A blue insertion line shows you where the dragged event will end up.



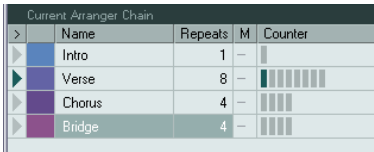
An event is dragged into the arranger chain.

- By dragging arranger events from the Project window into the arranger chain.

If you followed our example, you should now have arranger events arranged in a very basic pop song pattern. However, we have used audio files that are only a few bars long – to turn our pattern into a “song” (or at least into a basic sketch of the song structure), these files must be looped. This is where the Repeats function comes in.

If you want an event to repeat several times, proceed as follows:

- Click in the Repeats field for an event, type in the desired number of repeats and press [Enter]. When playing back the arranger chain, the Counter column indicates which repeat of this event is currently playing.



- Click in the Mode field for an event and select the desired repeat mode.

Option	Button	Description
Normal		In this mode, the arranger chain will be played back as you set it up.
Repeat forever		In this mode, the current arranger event will be repeated in a loop until you either click on another event in the Arranger Editor or press play once again.
Pause after Repeats		In this mode, the playback of the arranger chain will be stopped after having played back all repeats of the current arranger event.

When you now play back the arranger chain, you will hear the complete arrangement. Proceed as follows:

1. Make sure that Arranger mode is activated.
In Arranger mode the project will be played back using the arranger settings.



2. Position the Arranger Editor window so that you can see the arranger track in the Project window, and click in the arrow column for the event at the top of the list. You will see the project cursor jump to the beginning of the first event specified in the arranger chain.
3. Activate playback, either from the Arranger Editor or on the Transport panel.
The events are played back in the specified order.

Editing the arranger chain

In the arranger chain on the left, you can do the following:

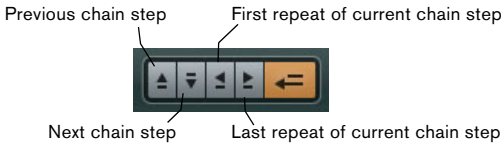
- Select multiple events by [Ctrl]/[Command]-clicking or [Shift]-clicking as usual.
- Drag events to move them in the list.
- Drag events holding [Alt]/[Option] to create copies of the selected items.

The insert location for both move and copy operations is indicated by a colored insertion line. A blue line indicates that the move or copy is possible; a red line indicates that moving or copying events to the current position is not allowed.

- Use the Repeats column to specify how many times each event is to be repeated.
- Click the arrow to the left of an event in the arranger chain to move the playback position to the start of that event.
- To remove an event from the list, right-click on it and select "Remove Touched" from the context menu. To remove several events, select them, right-click and select "Remove Selected".

Navigating

To navigate between arranger events, you use the arranger transport buttons:







These controls are available in the Arranger Editor, on the Project window toolbar, and on the Transport panel.

In the Arranger Editor, the event that is currently played back is indicated by an arrow in the leftmost column, and the indicators in the Counter column.

Managing arranger chains

You can create several arranger chains. This way, you can create alternative versions for playback. In the Arranger Editor, the toolbar buttons on the right are used for this:

Button	Description
	Click this to rename the current arranger chain.
	Creates a new, empty arranger chain.
	Creates a duplicate of the current arranger chain, containing the same events.
	Removes the currently selected arranger chain. Only available if you have created more than one arranger chain.

- In the Inspector, these functions are accessed from the Arranger pop-up menu (opened by clicking on the Arranger name field).

The arranger chains you create will be listed on the Name pop-up menu, found in the Arranger Editor to the left of the buttons, at the top of the arranger track Inspector, and in the track list. Please note that to be able to select another arranger chain from the pop-up menu, the Arranger mode must be activated.

Flattening the arranger chain

When you have found an arranger chain that suits your purposes, you can “flatten” it, i.e. convert the list into a linear project. Proceed as follows:

1. Click the Flatten button (or select Flatten Chain from the pop-up menu in the Inspector for the arranger track). The events and parts in the project are reordered, repeated, resized, moved and/or deleted (if these are not within the boundaries of any used arranger event), so that they correspond exactly to the arranger chain.



The Flatten button

2. Activate Playback.

The project will now play back exactly as in Arranger mode, but you can view it and work with it as usual.

⚠ Flattening the arranger chain may remove events and parts from the project. Only use the Flatten function when you know you do not want to edit the arranger track/chain any more. If in doubt, save a copy of the project before flattening the arranger chain.

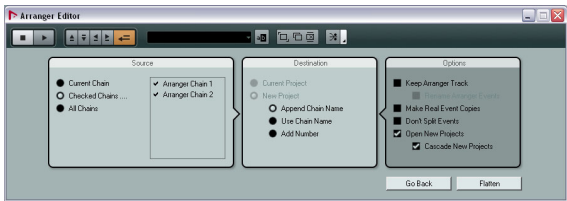
Flattening options

Sometimes it might be useful to keep the original arranger events even after flattening the arranger track. By using flattening options you can define which chain is flattened, where it is stored and how it is named together with other options.

1. Click the Flattening options button.



2. In the window that opens, select the desired options.



In the Source section you can specify which arranger chains are flattened. The available options are:

Option	Description
Current Chain	If you activate this option, only the current chain will be flattened.
Checked Chains...	If you activate this option, you can select the arranger chains you want to flatten in the list to the left.
All Chains	If you activate this option, all arranger chains of the current project will be flattened.

The Destination section allows you to choose where the result of the flattening is saved. The available options are:

Option	Description
Current Project	This is only available if you have selected “Current Chain” as Source. If you activate this option, the result of the flattening of the current chain will be saved in the current project.
New Project	If you activate this option, you can flatten one or several chains in a new project. In this case it might be useful to use naming options. If you activate “Append Chain Name”, the Chain Names will be appended in brackets to the project name. If you activate “Use Chain Name”, the new projects will have the name of the current arranger chains. If you activate “Add Number”, the new projects will be named like the old ones and a number will be appended in brackets.

In the Options section you can make further settings. The available options are:

Option	Description
Keep Arranger Track	If you activate this option, the arranger track will be kept when flattening the arranger chain. Activate “Rename Arranger Events” to append a number to the events, according to their use. For example, if you use arranger event “A” two times, the first occurrence will be renamed “A 1” and the second “A 2”.
Make Real Event Copies	Normally, you will get shared copies when flattening the arranger track. If you activate this option, real copies will be created instead.
Don't Split Events	If this option is activated, MIDI notes that start before or are longer than the arranger event will not be included. Only MIDI notes that begin and end inside the arranger event boundaries will be taken into account.
Open New Projects	If you activate this option, a new project will be created for every flattened arranger chain. If you activate the “Cascade New Projects” option the opened projects will be cascaded.

3. You can now flatten the arranger track by clicking the Flatten button.

If you realize that you want to do further arrangements, you can click the “Go Back” button and make your adjustments. Your Flattening settings will be kept.

4. Click the “Go Back” button to go back to the Arranger Editor or close the window by clicking its Close button.

Live mode

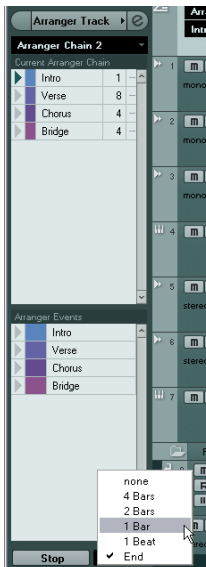
If you have set up an arranger track and play it back, you have also the possibility to influence the playback order “live”. Note that the Arranger mode has to be activated to be able to use the Live mode.

1. Set up an arranger chain in the Inspector or in the Arranger Editor for an arranger track, activate the Arranger mode and play back your project.

Now you can use your arranger events listed in the lower section of the Inspector to play back your project in Live mode.

2. Switch into Live mode by clicking on the little arrow in the lower list of the Inspector to the left of the arranger event you want to trigger.

The arranger event will be looped endlessly, until you click on another arranger event. This might be useful, for example, if you want to loop a guitar solo with a flexible length.



In the Jump Mode pop-up menu, you can define how long the active arranger event will be played, before jumping to the next one. The following options are available:

Option	Description
None	Jumps to the next section immediately.
4 bars, 2 bars	When one of these modes is selected, a grid of 4 or 2 bars (depending on the setting) will be placed on the active arranger event. Whenever the respective grid line is reached, playback will jump to the next arranger event. An example: Let's say you have an arranger event which is 8 bars long and the grid is set to 4 bars. When the cursor is anywhere within the first 4 bars of the arranger event when you hit the next arranger event, playback will jump to the next event when the end of the fourth bar of the arranger event is reached. When the cursor is anywhere within the last 4 bars of the arranger event, playback will jump to the next event at the end of the event. When an event is shorter than 4 (or 2) bars and this mode is selected, playback will jump to the next section at the event end.
1 bar	Jumps to the next section at the next bar line.
1 beat	Jumps to the next section at the next beat.
End	Plays the current section to the end, then jumps to the next section.

■ You can stop Live mode by clicking the Stop button or go back to “normal” playback in Arranger mode by clicking on any arranger event in the upper list.

In the latter case, playback will be continued from the arranger event where you clicked.

Arranging your music to video

The relative time of your arranger track can be taken as a reference instead of the project time. This is useful, if you want to use the arranger track to compose music for video and fill a specific video section with music, by repeating the corresponding number of arranger events.

If you position your external sync master device to a position that does not match the Project Start time, Nuendo will jump automatically to the right position in the arranger track and will start playback from there, i.e. the correct relative position and not the absolute project time will be found. The reference for the external timecode can be MIDI or any other timecode that can be interpreted/read by Nuendo.

An example:

1. Set up a project with a MIDI track and three MIDI parts. The first part should start at position 00:00:00:00 and end at position 00:01:00:00, the second should start at position 00:01:00:00 and end at position 00:02:00:00 and the third should start at position 00:02:00:00 and end at position 00:03:00:00.

2. Activate the Sync button on the Transport panel.

3. Add an arranger track and create arranger events that match the MIDI parts.

4. Set up the arranger chain "A-A-B-B-C-C", activate the Arranger mode and play back your project.

5. Start external timecode at position 00:00:10:00 (within the range of "A").

In your project, the position 00:00:10:00 will be located and you will hear "A" playing. Nothing special!

Now, let's see what happens if your external sync master device starts at a position that does not match the Project Start time:

6. Start at 00:01:10:00 (within the range of what originally was "B").

In your project, the position 00:01:10:00 will be located and you will hear "A" playing, because it plays twice in the arranger track.

7. Start external timecode at position 00:02:10:00 (within the range of what originally was "C").

In your project, the position 00:02:10:00 will be located and you will hear "B" playing, because it plays "later" in the arranger track.

⇒ If the Arranger mode is not activated or no arranger track exists, Nuendo will work as usual.

Introduction

Nuendo offers transpose functions for audio, MIDI and instrument parts and for audio events. These allow you to create variations of your music or change the harmonics of an entire project or separate sections.

Transpose can be applied on three levels:

- To the entire project

By changing the project Root Key in the Project window toolbar, the whole project will be transposed (see [“Transposing an entire project with the root key”](#) on page 130).

- To sections of the project

By creating transpose events on the transpose track, you can set transpose values for separate sections of your project (see [“Transposing separate sections of a project using transpose events”](#) on page 132).

- To individual parts or events

By selecting individual parts or events and changing their transpose value in the info line, you can transpose individual parts or events (see [“Transposing individual parts or events using the info line”](#) on page 133).

⚠ The transpose functions do not change the actual MIDI notes or the audio, but only affect the playback.

Apart from the transpose features described in this chapter, you can also transpose all MIDI notes on the selected track using the MIDI modifiers (see [“Transpose”](#) on page 374), selected notes using the Transpose dialog (see [“Transpose”](#) on page 396), and MIDI tracks using MIDI effects (see the separate PDF document “Plug-in Reference”).

Transposing your music

In the following sections we will describe the different possibilities of transposing your music. Note that these can also be combined. However, we recommend you to set the root key first, before recording or changing transpose values on the transpose track.

⚠ As a general rule, always set the root key first when you work with content with a defined root key.

Transposing an entire project with the root key

The root key you specify for a project will be the reference that audio or MIDI events in your project will follow. You can however exclude separate parts or events from being transposed, e.g. drums or percussion (see [“The Global Transpose setting”](#) on page 133).

Depending on whether you are using events which already contain root key information or not, the procedures differ slightly.

If the events already contain root key information

Let's say you want to create a project based on loops. Proceed as follows:

1. Open the MediaBay and drag some loops into an empty project, see [“Inserting the files into the project”](#) on page 341.

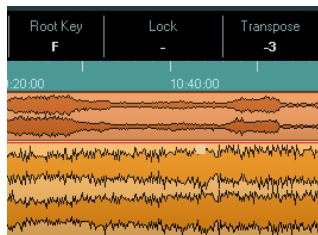
For this example, import audio loops with different root keys.

2. Open the Root Key pop-up menu in the Project window toolbar and set the project root key.

If the Root Key pop-up menu is not visible, right-click the toolbar and select the “Project Root Key” option from the context menu. By default, no project root key is specified (“-”).



The entire project will be played back with this root key. To do so, the separate loops are transposed to match the project root key. For example, if you have imported a bass loop in C and the project root key is set to E, the bass loop will be transposed up by 4 semitones.



3. With the root key set, record some audio or MIDI.

The recorded events will get the project root key.

4. When you are done, you can change the project root key and your events will follow.

⚠ If you work with drums or percussion, exclude these from being transposed by setting the “Global Transpose” setting on the info line to “Independent” (see [“The Global Transpose setting”](#) on [page 133](#)).

If the events do not contain root key information

Let’s say you have created a project by recording audio and importing some MIDI loops, and you want to match the root key of the whole project to the register of a certain singer.

Proceed as follows:

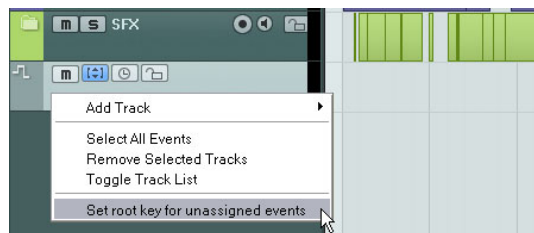
1. Open the Project menu and select “Transpose” from the Add Track submenu (or right-click the track list select the corresponding option from the context menu).

A transpose track is created. You can only have one transpose track in a project.

2. Set the project to the desired root key by selecting the corresponding option from the Root Key pop-up menu in the Project window toolbar.

3. Right-click the transpose track in the track list and select “Set root key for unassigned events” from the context menu.

This sets the project root key for all parts or events not containing any root key information. This option is only available, if a project root key has been set.



⚠ If you work with drums or percussion, exclude these from being transposed by setting the “Global Transpose” setting on the info line to “Independent” (see [“The Global Transpose setting”](#) on [page 133](#)).

Recording with a project root key

Let’s say that you want to record a guitar line for a project that is in D# minor, but your guitar player prefers to play in A minor. In this case, change the project root key to A, so that you can record your guitar. Proceed as follows:

1. Open your project and set the project root key to A. All parts and events will be transposed in order to match the root key.

2. Listen to your project and verify that no drums and percussions have been transposed.

If drums have been transposed, select them and set their Global Transpose setting to “Independent”.

3. Record your guitar line as desired.

4. When you are done and satisfied with the result, you can change the project root key back to D# minor and your events will follow.

⚠ For recorded audio events and MIDI parts, the “Global Transpose” setting on the info line is automatically set to “Follow”, i.e. the events or parts will get the project root key.

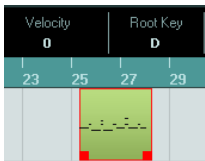
Changing the root key of single events or parts

If you want to check if an audio event or part has root key information or if you want to change it, proceed as follows:

1. Open the Pool and display the Key column by activating the Root Key option on the View/Attributes pop-up menu.
 2. Click in the Key column for the desired audio event and set the root key according to your needs.
You can also check and assign root keys in the MediaBay.
- ⇒ If you change the root key of an audio part or event, the corresponding audio file will not change. To save the root key in the audio file, you have to use the “Bounce Selection” function on the Audio menu.

To check or change the root key setting of a MIDI part, proceed as follows:

1. Select your MIDI part in the Project window and check the Project window info line.



A MIDI part with the root key set to “D”

2. Click on the root key value in the info line to open the corresponding pop-up menu and select the desired root key.

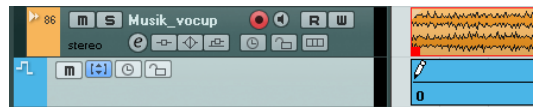
⚠ If you change the project root key after setting the event root key, the events will keep their own root key settings, and will be transposed to match the project root key. If you record an audio or a MIDI part and the project root key is specified, this root key is automatically set.

Transposing separate sections of a project using transpose events

Sometimes you may want to transpose only certain sections of your project, e.g. to create harmonic variations. This can be done by creating transpose events. Transpose events allow you to add a relative transpose offset by specifying transpose values in semitones. For example,

you can brighten up your loops in C major by transposing them by 5 semitones, so that the subdominant on F major is played back, or you can turn your hit more interesting by transposing the last chorus one semitone upwards.

1. Open the Project menu and select “Transpose” from the Add Track submenu (or right-click the track list select the corresponding option from the context menu).
A transpose track is created. You can only have one transpose track in a project.
2. Select the Pencil tool and click in the transpose track to create a transpose event.
A transpose event will be created from the point where you clicked until the end of the project.



3. To create another transpose event, click with the Pencil tool on the first transpose event.
By default, the transpose value of new transpose events is set to 0.



You can add more transpose events by clicking with the pencil tool.

4. Click in the transpose value field and enter the transpose value for the transpose event.
You can enter the desired value with the computer keyboard, use the mouse wheel or [Alt]/[Option]-click on the transpose value to open a value fader. You can specify values between -24 and 24 semitones.
 5. Play back your project.
The parts of your project on the same position as the transpose events will be transposed according to the specified transpose values.
- ⇒ You can also transpose the whole project using the transpose track. This is useful if your singer does not reach a certain pitch, for example. You could then transpose the whole project by approx. -2 semitones. Always remember to verify that the “Global Transpose” setting for drums and percussion is set to “Independent” on the info line (see [“The Global Transpose setting”](#) on [page 133](#)).

You can erase and move transpose events, but you cannot mute, cut or glue them. The “Locators to Selection” option does not apply on transpose events.

Transposing individual parts or events using the info line

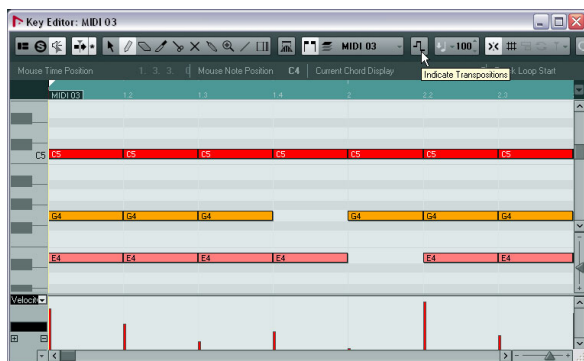
You can also transpose individual audio and MIDI parts and events via the info line (or the Inspector). This transposition will be added to the global transposition (i.e. the root key or the transpose events). Proceed as follows:

1. Select the event that you want to transpose.
 2. In the Project window info line, adjust the Transpose value as desired.
- ⇒ A global transpose change will not overwrite individual part or event transpose, but will be added to the transpose value for the part or event. In this case, it might be useful to keep the transposition within the octave range (see [“Keep Transpose in Octave Range”](#) on [page 134](#)).

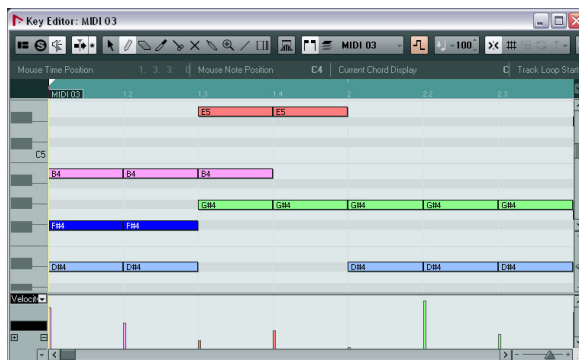
Other functions

Indicate Transpositions

When you transpose your music, you may sometimes want to visually compare the original sounds and the transposed music. For MIDI parts, you can check this by opening the Key Editor and clicking the “Indicate Transpositions” button. This will help you see how your MIDI notes will be transposed. If the button is activated, the Key Editor will show the note pitch you will hear, if it is deactivated, the Key Editor shows the original pitch of the notes in your MIDI part. By default, the “Indicate Transpositions” button is deactivated.



A MIDI part as originally recorded

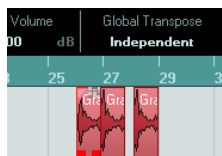


When you activate “Indicate Transpositions” you will see how your MIDI part will be transposed.

The Global Transpose setting

If you are working with drum and percussion loops or special effects (FX) loops, you will want to exclude these from being transposed. This can be achieved by locking them using the Global Transpose setting. Proceed as follows:

1. Open your project.
2. Select the desired event or part and set the “Global Transpose” setting on the info line to “Independent”.
A symbol will be displayed in the lower right corner of the selected part or event, indicating that it will not be transposed neither by changing the root key nor by specifying transpose events.



If Global Transpose is set to Independent, the selected part will not be transposed.

3. You can now change the project root key.
The “Independent” parts or events will not be affected by the root key changes.

⇒ If you import ready-made parts or events that are tagged drums or FX, Global Transpose will be automatically set to Independent.

If you record audio or MIDI, Global Transpose will be set to “Independent”, provided that the transpose track exists and you have specified at least one transpose event (even when the transpose value is not defined). In this case, your recording will sound exactly the way you played it. The transpose events will not be taken into account during recording and the recorded event will not get the project root key.

Have a look at the following example:

1. Set up a project with the root key in C.
2. Add a transpose track and enter transpose events with the values 0, 5, 7 and 0.
3. Record some chords with your MIDI keyboard. For our example, record C, F, G and C.

The transpose events are not taken into account and the result of your recording will be C, F, G and C. No root key will be set.

⇒ Recorded events are independent from Global Transpose.

If no transpose track exists or if no transpose event has been added, Global Transpose will be set to Follow.



If Global Transpose is set to Follow, the selected part will follow all global transpositions.

Locking the transpose track

If you want to prevent your transpose events from being changed by mistake, activate the Lock button on the transpose track. This way, you will not be able to move your transpose events or change their transpose values.

Muting transpose events

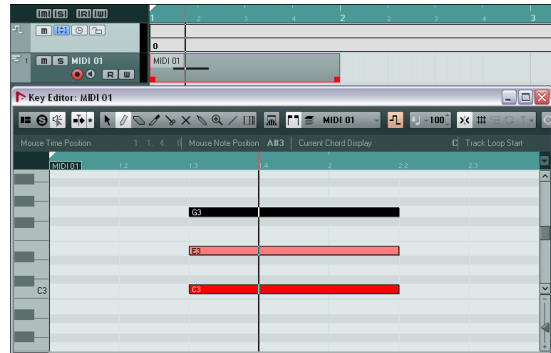
Sometimes it might be useful to disable the transpose track, e.g. to hear the original sound of individual tracks. If you activate the mute button on the transpose track, your transpose events will not be taken into account during playback.

Keep Transpose in Octave Range

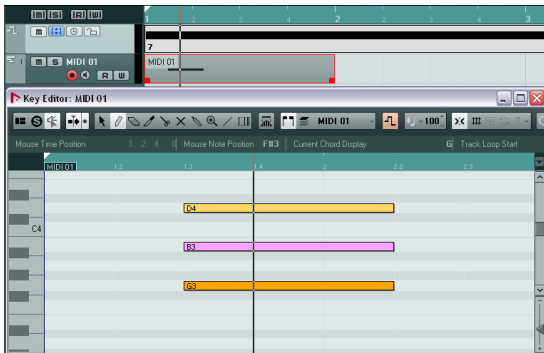
The “Keep Transpose in Octave Range” button on the transpose track (the button with an up and down arrow in brackets) keeps the transposition in the octave range. This option is activated by default. This way, nothing will be transposed by more than seven semitones. This ensures that your music never sounds unnatural because the pitch was raised too high or too low.

To understand the principle behind this, follow the example below:

1. Create a MIDI part, enter a C major chord, open the Key Editor and activate “Indicate Transpositions”.
- This way you can observe and understand what happens when you change the transposition.
2. Add a transpose track and create a transpose event.
- By default, the transpose value is set to 0.

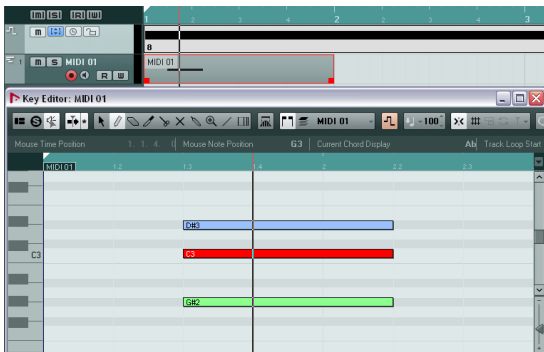


3. Make sure that the “Keep Transpose in Octave Range” button is activated on the transpose track and change the transpose value of the transpose event to 7. Your chord will be transposed accordingly.



If you enter a transpose value of 7, your chord will be transposed by seven semitones upwards. In this example, this would be G3/B3/D4.

4. Set the transpose value to 8 semitones.
As “Keep Transpose in Octave Range” is activated, your chord will now be transposed to the nearest interval or pitch.



Your chord has been transposed to the nearest pitch, this results in G#2/C3/D#3.

- ⚠ If you mainly work with audio loops, we recommend activating “Keep Transpose in Octave Range”.

Introduction

Markers are used to locate certain positions quickly. If you often find yourself jumping to a specific position within a project, you should insert a marker at this position. You can also use markers to make range selections (see [“Using markers to make range selections in the Project window”](#) on [page 143](#)) or for zooming (see [“Zooming to cycle markers”](#) on [page 137](#)).

Markers are located on marker tracks. For postproduction purposes, you can set up multiple marker tracks. This is useful for viewing and working with Edit Decision Lists (see [“Importing EDL CMX3600 files \(Edit Decision Lists\)”](#) on [page 146](#)) and CSV files (see [“Exporting markers as CSV files”](#) on [page 148](#)).

There are two types of markers: position markers and cycle markers.

Position markers

As the name implies, position markers allow you to store a specific position. Position markers on the marker track are shown as marker events: vertical lines with the marker description (if assigned) and number beside it. If you select a marker track, all its markers are shown in the Inspector.

Cycle markers

By creating cycle markers you can store any number of left and right locator positions as start and end positions of a range and recall them by double-clicking on the corresponding marker. Cycle markers are shown on marker tracks as two markers bridged by a horizontal line. Cycle markers are ideal for storing sections of a project. By defining cycle markers for sections of a song, e.g. “Intro”, “Verse”, and “Chorus”, you can quickly navigate to the song sections and repeat the section by activating the Cycle button on the Transport panel.

Using cycle markers

Cycle markers represent ranges in your project. Therefore you can use them for moving the left and right locators:

- If you double-click on a cycle marker or select it from the Cycle pop-up menu in the track list, the left and right locators are moved to encompass the cycle marker. Now you can move the project cursor position to the start or the end of the cycle marker by moving it to the corresponding locator (e.g. by using the keys [1] and [2] on the numeric pad).
- ⇒ You can also use cycle markers to export specific ranges of your project with the Export Audio Mixdown dialog (see [“Mixing down to audio files”](#) on [page 474](#)).

Editing cycle markers using tools

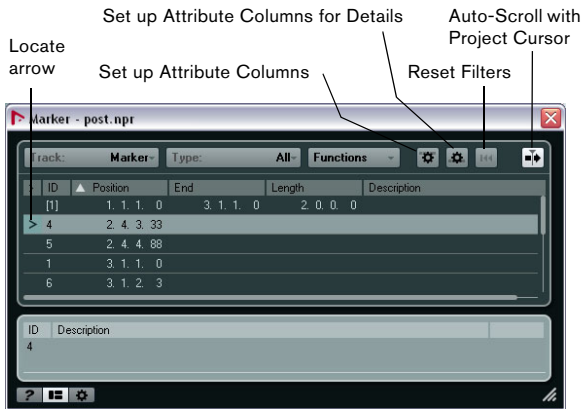
Cycle markers can be edited on marker tracks using the following tools (Snap is taken into account):

Tool	Use
Arrow tool	Drag the start or end handle of a cycle marker with the Arrow tool to change its start or end position, or drag the upper border to move the whole cycle marker. Double-click on a cycle marker to set the left and right locators.
Selection Range	Double-click on a cycle marker – this creates a selection range spanning all tracks in the project. You can also select a range inside the cycle marker and press [Ctrl]/[Command]-[X] to trim or to divide a cycle marker.
Pencil	Press [Ctrl]/[Command] and use the Pencil tool to create new cycle markers.
Eraser	Click with the Eraser tool to delete a cycle marker. If you hold down [Alt]/[Option] when you click, all consecutive markers are also be deleted.

Zooming to cycle markers

- When you select a cycle marker on the Zoom pop-up menu, the event display is zoomed in to show the selected range only (see the section [“Zoom presets and cycle markers”](#) on [page 60](#)).
- Note that only the cycle markers of the active marker track are shown on the Zoom pop-up menu.
- You can also zoom in by pressing [Alt]/[Option] and double-clicking on the cycle marker in the event display.

The Marker window



In the Marker window you can view and edit markers. The markers on the active marker track are displayed in the marker list in the order in which they occur in the project.

To open the Marker window, you have the following possibilities:

- Open the Project menu and select "Markers".
- Click the Show button in the marker section on the Transport panel.
- Use the key command (by default [Ctrl]/[Command]-[M]).

The Track and Type pop-up menus

- By selecting an entry from the Track pop-up menu, you select which of the marker tracks is activated. (For further information about the active marker track, see ["The active marker track"](#) on [page 143](#).)

You can also activate a marker track by clicking on the corresponding button in the track list. The marker list in the Marker window will be updated automatically.

- By selecting an entry from the Type pop-up menu, you select which markers (position markers, cycle markers, or all) are shown in the marker list.

Adding, moving, and removing markers

- To select a marker, click on it in the Marker window.
- To edit a selected marker, click on it. Select multiple markers by [Shift]-clicking or [Ctrl]/[Command]-clicking them.
- To add a position marker, open the Functions pop-up menu and select the "Insert Marker" option. A position marker is added at the current project cursor position on the active marker track. You can also use key commands for this, see ["Marker key commands"](#) on [page 145](#).
- To add a cycle marker, open the Functions pop-up menu and select the "Insert Cycle Marker" option. This adds a cycle marker between the left and right locators on the active marker track.
- To move one or more markers to a specific position, set the project cursor to the desired position, select the markers, and select the "Move Markers to Cursor" option from the Functions pop-up menu. You can also move markers by entering the new position numerically in the Position column. If a cycle marker is selected, the Move operation affects the cycle marker start position.
- To move one or several markers to another marker track, select them in the current Marker window, open the Functions pop-up menu and from the "Move Markers to Track" submenu select the desired track. The markers are no longer listed in the Marker window of the first marker track.
- To remove a marker, select it and select the "Remove Marker" option from the Functions pop-up menu.

Auto-Scroll with Project Cursor

This option helps you to keep track of the locate arrow, even if your project contains a large number of markers. When this option is activated, the window is automatically scrolled to keep the Locate arrow visible.

Navigating in the marker list

You can navigate in the marker list using your computer keyboard and select entries by pressing [Enter]. This is a quick and easy way to jump to markers during playback or recording:

- To move to the previous/next marker in the list, press [Up Arrow]/[Down Arrow].
- To jump to the first/last marker, press [PageUp]/[PageDown].
- To step through the attributes of a marker, select a marker, then click again and press [Tab].

You can step back by pressing [Shift]-[Tab].

⇒ When working with video, you can use the Marker window as a spotting list (a list of timecode values) to position your audio events according to the video events, see [“Using the Marker window as a spotting list”](#) on [page 543](#).

Marker attributes

The following sections describe how to set up and edit standard attributes and user attributes for markers in the Marker window and how to display them in the Details section.

Displaying attributes

By default, the following standard marker attributes are shown in the marker list of the Marker window:

Column	Description
Locate (left-most column)	An arrow indicates which marker is at the project cursor position (or closest to the project cursor). If you click in this column, the project cursor is moved to the corresponding marker position. This column cannot be hidden.
ID	This column shows the marker ID numbers, see “About marker IDs” on page 141 .
Position	In this column you can view and edit the markers' time positions (or start positions for cycle markers). This column cannot be hidden.
End	In this column you can view and edit the end positions of cycle markers, see “Cycle markers” on page 137 .
Length	In this column you can view and edit the length of cycle markers, see “Cycle markers” on page 137 .
Description	Here you can enter names or descriptions for markers.

You can show other attributes by clicking the “Set up Attribute Columns” button and selecting the desired attributes from the pop-up menu. In this menu the most common attributes for postproduction are listed in categories according to their usage: General, ADR, Dialog Spotting, Foley, SFX, Background, and User Defined (if available). The standard attributes are found in the Standard Attributes category.

⇒ The number in brackets following the category name helps to get a quick overview of how many attributes of a certain category are displayed as columns in the Marker window.

To configure which attributes and columns are shown, you can also use the following functions of the “Set up Attribute Columns” pop-up menu:

- To show all attributes in the Marker window, activate the “Show all” option.

Selecting “Hide all” will hide all attributes except for the Locate and Position columns.

- To show only the columns that are used for at least one marker, activate the “Show only used Attributes” option.

- If you activate the Row Count option on the “Set up Attribute Columns” pop-up menu, the rows of the marker list are numbered consecutively.

This can be useful when using filters for certain attributes, see [“Filtering attributes”](#) on [page 140](#).

Editing attributes

There are three different types of attributes: Text, Number, and Yes/No switch. Depending on the type, you can enter text or numerical values, or activate/deactivate the corresponding checkbox.

- To edit a marker attribute, select the corresponding marker, click in the desired attribute column, and make your settings.

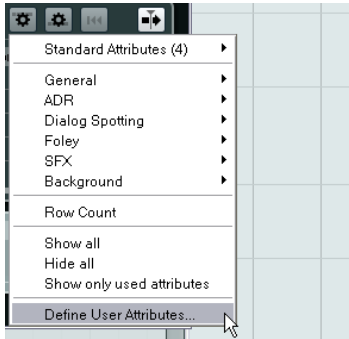
- To change the attributes of several markers, select the markers and click the checkbox for the desired attribute. All selected markers will change their attributes accordingly. Note that this does not work when clicking on a timecode value or a text field.

⇒ To navigate in the list of marker attributes, you can also use the [Tab] key and the arrow keys.

Setting up user attributes

To set up your own attributes, proceed as follows:

1. Click the “Set up Attribute Columns” button and select “Define User Attributes...”.



2. In the User Attributes dialog, click the Add User Attribute (+) button.

A new attribute is added to the attributes list.

3. Enter a name for the new attribute and define its type. Attributes can be of the types “Text”, “Number”, or “Yes/No” switch.

- Click the “Store as Defaults” button in the dialog to save your user attributes as default.

New projects will contain these attributes in the User Defined category of the “Set up Attribute Columns” pop-up menu.

4. Click OK.

The new attribute is added to the list of available attributes and can be displayed in the Marker window.

- To remove a user attribute, select it in the list and click the Remove User Attribute (-) button.

The attribute is removed from the list and the pop-up menu.

- To restore your previously saved user attributes, click the “Restore Defaults” button.

Note that this will remove any attributes not saved as defaults.

Sorting and reordering columns

You can customize the display of the marker attributes in the marker list by sorting or reordering the columns. Proceed as follows:

- To sort the marker list by a specific attribute (except Row Count), click on the corresponding column header.
- To reorder the marker attributes, drag and drop the corresponding column headers.

- To adjust the width of a column, place the mouse pointer between two column headers and drag left or right.

The pointer changes to a divider when you place it between two column headers.

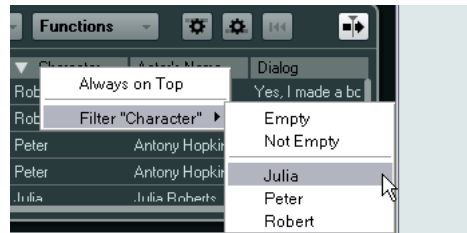
- ⇒ No matter by which attribute you sort, the second sort criterion will always be the position attribute.

Filtering attributes

When you are working with many markers so that the list is very long, you may want to filter the list to show only markers with a certain attribute value, such as the name of a character. Proceed as follows:

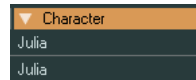
1. Right-click on the column header of the attribute that you want to use for the filter.

A context menu appears.



2. From the “Filter <Attribute Title>” submenu, select the desired attribute value.

The marker list is filtered according to your settings, and the column header changes color to indicate that a filter is applied.



- To remove the filter, right-click the column header and select the “Reset <Attribute Title> Filter” option from the context menu.

- To remove all filters for all columns, click the “Reset Filters” button.

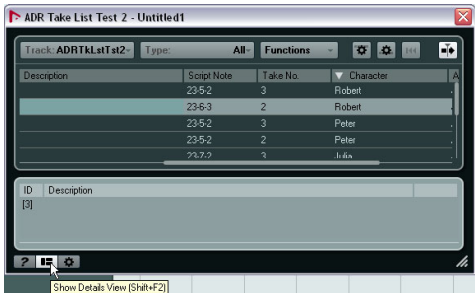
The filters are also reset if you change the displayed marker track or hide a filtered attribute. Filter settings are not saved in the project or defaults.

Using the Details view

The Details view is displayed below the regular marker list. It shows the details for the marker that is selected in the marker list. If more than one marker is selected, only the details for the first marker of the selection are shown.

1. To open the Details view, click the “Show Details View” button.

The “Set up Attribute Columns for Details” button appears next to the “Set up Attribute Columns button”.



2. Click the “Set up Attributes Columns for Details” button and select the desired options from the pop-up menu to determine which attributes are shown in the Details view.

You can edit the marker details in the same way as in the marker list. The changes are reflected in the main marker list.

- To hide the Details view, click the “Show Details View” button again.

⇒ The details view supports line breaks which is useful for attributes with long texts.

Marker preferences

You can access the marker preferences by clicking the corresponding button in the bottom left corner of the Marker window.



The following marker preferences are available:

Column	Description
Cycle follows when locating to Markers	This sets the left and right locators automatically to a position or cycle marker, when locating to this marker. This is useful if you need to set the locators on the fly, e.g. during recording for Punch In/Punch Out.
Show marker IDs on marker track	When this option is activated, the marker IDs are shown on the marker track.
Sync Selection	When this option is activated, the Marker window selection is linked to the selection in the Project window.

About marker IDs

Each time you add a marker, it is automatically and sequentially assigned an ID number, starting from 1. IDs for cycle markers are shown in brackets and start from [1]. ID numbers can be changed at any time – this allows you to assign specific markers to key commands.

⇒ If you move a marker from one marker track to another by drag & drop in the Project window and the marker ID is already used on this track, the inserted marker automatically gets a new ID.

Assigning marker IDs to key commands

You can move the project cursor to the markers 1 to 9 by pressing [Shift]-[1] to [9] on the numeric keypad. If you wish to locate other markers in this way, simply reassign the marker IDs:

1. Select the marker to which you wish to assign a new marker ID in the Marker window.

2. Click in the ID column of the selected marker and enter a new ID.

If the number you enter was previously used for another marker, these markers will swap IDs.

3. Repeat this procedure as necessary for other markers.

- You can also remove a marker with an ID number between 1 to 9 to free up a key.

- For more information about marker key commands, see “Marker key commands” on [page 145](#).

Reassigning marker IDs

Sometimes, especially when setting markers on the fly, you may forget or miss to set a marker. When added later, this marker's ID will not correspond to its position on the marker track. Therefore, it is possible to reassign the IDs for all markers on a track.

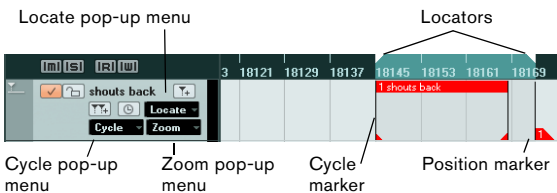
Proceed as follows:

1. Open the Marker window and select the marker track whose ID numbers you want to reassign.
2. Open the Functions pop-up menu and select either "Reassign Position Marker IDs" or "Reassign Cycle Marker IDs".

The marker IDs of the selected type are reassigned to match the order of markers on the marker track.

Marker tracks

Marker tracks are used for adding and editing markers.



In the track list area for the marker track you can find three pop-up menus, which help you to select or zoom to the markers that you select:

Option	Description
Locate pop-up menu	If you select a position or a cycle marker in this pop-up menu, the corresponding marker in the event display or in the Marker window is selected.
Cycle pop-up menu	If you select a cycle marker in this pop-up menu, the left and right locators are set to the corresponding cycle marker.
Zoom pop-up menu	If you select a cycle marker in this pop-up menu, the view zooms to the corresponding cycle marker.

⇒ Markers shown on marker tracks are exactly the same as shown in the Marker window, and any changes made on a marker track is reflected in the Marker window and vice versa.

Adding, moving, and removing marker tracks

- To add a marker track to the project, select Marker from the Add Track submenu of the Project menu.
 - To move a marker track to another position in the track list, click and drag it up or down.
 - To remove one or more marker tracks, right-click them in the track list and select "Remove Selected Tracks" from the context menu.
 - Empty marker tracks can also be removed by selecting "Remove Empty Tracks" from the Project menu.
- Note that Remove Empty Tracks also removes any other tracks that are empty.

⇒ When you remove all marker tracks, the marker track that you removed last (including all its markers) is moved to the clipboard. If you later insert a new marker track, this track is pasted from the clipboard into the track list.

Editing markers on marker tracks

The following editing functions can be performed directly on a marker track:

- Adding position markers "on the fly".
Use the [Insert] key (Win) or the "Add Marker" button in the track list for the marker track to add position markers at the current cursor position during playback.

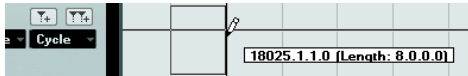
Add Marker/Add Cycle Marker buttons



- Adding a cycle marker.
Clicking the "Add Cycle Marker" button in the track list for the marker track adds a cycle marker spanning the area between the left and right locator.
- Selecting markers.
You can use standard selection techniques like a selection rectangle, or use [Shift]-clicking to select separate markers. When selecting markers on the marker track, they are also selected in the Marker window.
- Drawing in position markers.
By using the Pencil tool (or pressing [Alt]/[Option] and using the Arrow tool), you can create position marker events at any position on the track. If Snap is activated on the toolbar, this determines at which positions you can draw markers.

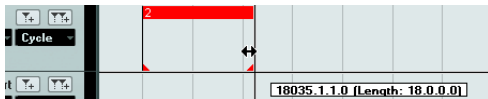
- **Drawing in cycle markers.**

To draw a cycle marker range, press [Ctrl]/[Command] and use the Pencil tool or the Arrow tool. If Snap is activated on the toolbar, this determines at which positions you can draw markers.



- **Resizing cycle markers.**

Select a cycle marker by clicking on it. Two handles appear at the bottom of the start and end events. If you click and hold one of the handles you can drag the event left or right to resize the cycle marker. This can also be done numerically on the info line.



- **Moving markers.**

Click and drag to move the selected markers. You can also edit marker positions on the info line. As usual, Snap is taken into account. If you move markers from one track to another, the marker gets the numbering of the first free marker ID on the track where it is dropped (see [“About marker IDs”](#) on [page 141](#)).

- **Removing markers.**

This is done exactly the same way as for other events, i.e. by selecting them and pressing [Delete], using the Erase tool, etc.

Using markers to make range selections in the Project window

Besides enabling you to quickly move the project cursor and the locators, markers can be used in conjunction with the Range Selection tool to make range selections in the Project window. This is useful if you quickly want to make a selection that spans all tracks in the project.

Moving and copying sections

To quickly move or copy complete sections of the project (on all tracks), proceed as follows:

1. Set markers at the start and end of the section that you want to move or copy.
2. Select the Range Selection tool and double-click on the marker track between the markers.
Everything in the project within the marker boundaries is selected. Any functions or processing you perform now affect the selection only.

3. Click on a marker track in the selected range and drag the range to a new position.

- If you hold down [Alt]/[Option] while you drag the range, the selection in the Project window is copied instead.

Multiple marker tracks

You can create up to 32 marker tracks. Multiple marker tracks are useful when working in a postproduction context. For example, they can be used to import Edit Decision Lists (EDLs) or import/export CSV files for Automatic Dialog Replacement (ADR).

A possible scenario would be to create a marker track with cycle markers for sections of the audio, and another marker track with important sync points in the video. You can also use multiple marker tracks to insert markers for different users in a network or different narrators in a movie (see [“Working with multiple marker tracks – an example”](#) on [page 144](#)).

Naming marker tracks

By default, the first marker track you create is called “Marker”, the second “Marker 02”, and so on. If you work with multiple marker tracks, it is recommended to name marker tracks according to their purposes, e.g. audio, video, or scene.

You can name marker tracks by double-clicking on the marker track name in the track list or the Inspector and entering a new name.

The active marker track

When you are working with multiple marker tracks, only one track is active. All editing functions affect the markers on the active track only. You activate a track by clicking the “Activate this track” button in the track list.

The following rules apply:

- When you add a new marker track, this track is automatically active.
- When you remove an active track, the topmost marker track in the track list is activated.
- When using cycle markers for zooming (see [“Zooming to cycle markers”](#) on [page 137](#)), only the cycle markers of the active track are displayed on the Zoom pop-up menu.

- When exporting an audio mixdown of the audio between the cycle markers (see “Exporting and importing markers” on page 145), only the cycle markers of the active track are displayed in the Export Audio Mixdown dialog.
- Most marker key commands affect the active track, see “Marker key commands” on page 145.

Locking marker tracks

You can lock one or more marker tracks by clicking the corresponding lock button of the track. When a marker track is locked, you cannot edit the track and its markers. However, you can still rename the track or change its status (active/inactive). In the Marker window and the Project Browser, the unavailable features of a locked track are grayed out.

Working with multiple marker tracks – an example

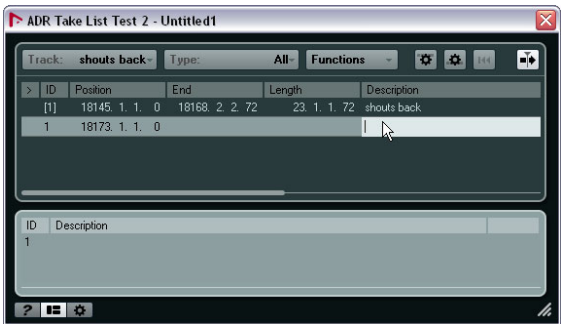
Let’s say you have a video project where the dialog of two narrators is to be replaced. All you have to do is create different marker tracks for the individual narrators and set up the markers according to the video sections that need to be dubbed.

Proceed as follows:

1. Add two marker tracks to the project that you want to edit and name them according to the narrators.
2. Open the File menu and select “Key Commands...”. The Key Commands dialog opens.
3. In the Marker category, set up a key command for the “Insert and name Marker” command. This command adds a position marker, opens the marker window and activates the Description column, so that you can insert a name for the new marker. This makes it easier for you to insert markers on the fly and name them instantly.
4. Set up key commands for the “Activate next Marker Track” and “Activate previous Marker Track” commands. This helps you to activate the marker track where you want to insert the markers.

5. Activate the marker track for the first narrator, play back the video file, and at the position where the first dialog section should be replaced, trigger the “Insert and name Marker” command.

The Marker window opens; the Description column is active.



6. Enter a name or description for the corresponding section and press [Return] to confirm.

On the active track in the Project window a new marker is created. It might be useful to name the markers according to the first words of the dialog.

7. Trigger the “Activate next Marker Track” or “Activate previous Marker Track” key command, depending on which track you want to insert the following marker. A message informs you that a different marker track is now active.



8. Trigger the “Insert and name Marker” key command at the position where the next dialog section should be replaced.

Repeat this procedure for all markers that you want to insert.

Marker key commands

You can check or change any key command assignments for the marker commands in the Transport and Marker categories of the Key Commands dialog. In the following section, the available key commands for markers are listed. If not stated otherwise, the key commands only affect the active marker track.

Key commands in the Transport Category:

Operation	Description	Default key command
Insert Cycle Marker	Creates a new cycle marker between the left and the right locator.	-
Insert Marker	Creates a new marker at the current project cursor position.	[Insert] (Windows only)
Locate Next Marker	Moves the project cursor to the right to the next marker position (if any).	[Shift]-[N]
Locate next marker in marker window	Moves the project cursor to the next marker position, or to the start of the next cycle marker position (if any).	-
Locate Previous Marker	Moves the project cursor to the left to the previous marker position (if any).	[Shift]-[B]
Locate previous marker in marker window	Moves the project cursor to the previous marker position, or to the beginning of the next cycle marker position in the Marker window (if any).	-
Play until next marker	Plays back your project from the current project cursor position to the next marker position.	-
Recall Cycle Marker 1-9	Moves the left and right locators to encompass the specified cycle marker (1 to 9).	[Shift]-[Pad1] to [Pad9]
Set Marker 1-9	Moves the specified marker (1 to 9) to the current project cursor position.	[Ctrl]-[1] to [9]
To Cycle Marker 1-9	Moves the project cursor to the start position of the specified cycle marker (1 to 9).	-
To Cycle Marker X	Moves the project cursor to the start position of a marker. Use this key command, let go of it and enter the desired marker ID.	-
To Marker 1-9	Moves the project cursor to the specified marker (ID 1 to 9).	[Shift]-[1] to [9]
To Marker X	Moves the project cursor to the position of the specified marker. Use this key command, let go of it and enter the desired marker ID.	-

Operation	Description	Default key command
Toggle: Cycle follows when locating to markers	Toggles the marker preference "Cycle follows when locating to markers" (see "Marker preferences" on page 141).	-

Key commands in the Marker category:

Operation	Description	Default key command
Activate Marker Track	Activates the selected marker track. If more than one marker track is selected, the topmost track is activated.	-
Activate next Marker Track	Activates the next marker track in the track list. When you use this key command, a message informs you that the next marker track is activated.	-
Activate previous Marker Track	Activates the previous marker track in the track list. When you use this key command, a warning appears informing you that the previous marker track is activated.	-
Insert and name Cycle Marker	Adds a cycle marker between the left and the right locator, opens the marker window and activates the Name column, so that you can insert a name for the new cycle marker.	-
Insert and name Marker	Adds a marker, opens the marker window and activates the Name column, so that you can insert a name for the new marker.	-
Show only used attributes	Shows only the used attributes in the Marker window.	-

⇒ Where no default key command is specified, you need to define your own stroke sequence in the Key Commands dialog, see ["Key commands"](#) on [page 580](#).

Exporting and importing markers

In Nuendo, markers and marker tracks can be imported and exported in different ways. You have the following possibilities:

- You can import EDL CMX3600 files.
- You can import/export CSV files.
- You can import/export markers contained in MIDI files.
- You can import/export track archives that contain marker tracks.

Importing EDL CMX3600 files (Edit Decision Lists)

In Nuendo, you can import Edit Decision Lists (EDLs) in CMX3600 format. EDLs are cut lists, i.e. representations of video edits that can be used to align audio events to a reference video file in Nuendo. They contain reel and timecode data that help you to detect the exact position of each video clip. Most EDLs are simple ASCII files created by offline editing systems, but you can also create, open, and edit them manually with a text editor.

The information contained in an EDL can be used in Nuendo to place audio events in the Project window at the specific timecode positions that correspond to the edits made in the video editing suite.

Importing EDL CMX3600 files

EDLs allow you to edit your audio according to the cuts of a video. When you import an EDL in Nuendo together with the cut video file, each cut described in the EDL is indicated by a marker.

⇒ Every track in the EDL results in a new marker track in Nuendo. One video track and up to four audio tracks of the EDL can be imported.

To import an EDL CMX3600 file, proceed as follows:

1. Create a new project.

This is not strictly necessary, but helps you keep track of things.

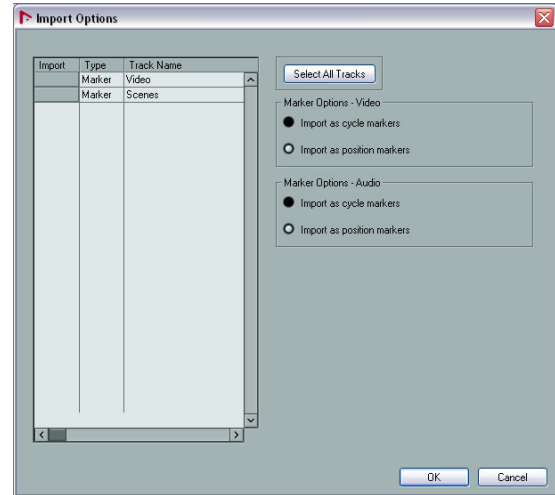
2. Set up the project frame rate according to the frame rate of the EDL that you want to import.

For EDL import, Nuendo supports the frame rates 24fps, 25fps, 29.97fps, 29.97dfps, 30fps, and 30dfps.

3. Open the File menu and select “EDL CMX3600...” from the Import submenu.

4. In the file dialog that opens, select the file that you want to import and click Open.

The Import Options dialog opens.



5. In the Import column on the left, activate the marker tracks that you want to import.

You can also select all tracks by clicking the Select All Tracks button.

6. In the “Marker Options - Video” and “Marker Options - Audio” sections, select whether you want to import position or cycle markers.

7. Click OK to import the EDL file.

If there are EDL edits outside the current project range, you are asked if you want the range to be automatically adjusted.

About scene detection

EDL CMX3600 files can also be used for scene detection. Scene detection can be useful if you want to fill specific sections of your project with a certain background atmosphere (by setting the locators to the cycle marker and using the Fill Loop option from the Edit menu). On import, each scene is indicated by a colored cycle marker.

Nuendo supports the following ways of scene naming:

- Three number scene naming, e.g. 25-3-5

The first is the scene number, the second is the setting or shooting angle and the third is the take number. As separators, the following characters can be used: comma (,), semicolon (;), full stop (.), hyphen (-), underscore (_), slash (/), backslash (\).

```
002 7350 V C 11:58:48:17 11:58:54:10 10:00:05:04 10:00:10:22
* FROM CLIP NAME: 37401/2/3 K1.NEW.01

003 7351 V C 11:58:54:10 11:58:55:22 10:00:10:22 10:00:12:09
* FROM CLIP NAME: 37401/2/3 K2.NEW.01
```

- Clip names

Scenes can also be identified by their clip names.

```
001 UNTITLED AA/V C 01:02:19:14 01:02:30:20 01:00:00:00 01:00:11:06
* FROM CLIP NAME: C0007.MOV
* COMMENT:
* CLIP FILTER: SHIFT FIELDS
AUD 3 4

002 UNTITLED AA/V C 01:02:30:20 01:02:40:17 01:00:11:06 01:00:21:03
* FROM CLIP NAME: C0008.MOV
* COMMENT:
* CLIP FILTER: SHIFT FIELDS
AUD 3 4
```

Recommendations

When exporting EDLs from your offline editing system, keep the following rules in mind in order to achieve the best import results in Nuendo:

- Export your EDL in CMX3600 format. Nuendo only supports the CMX3600 format.
- Add clip names as comments to the EDL and use a consistent naming scheme. These names are used for naming markers and detecting scenes.

⇒ Make sure that you set the correct export options in your video editing application (e.g. Final Cut Pro, Avid Xpress Pro) when creating the EDL.

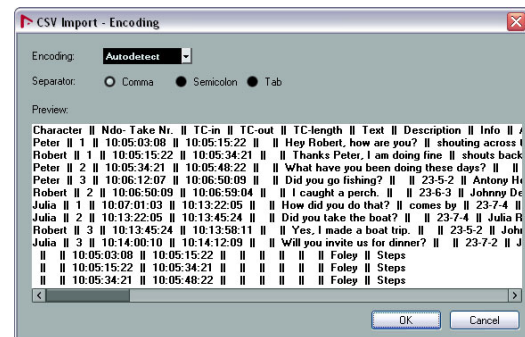
Importing a CSV file

In Nuendo, you can import CSV (Comma Separated Values) files that were created with an additional program (taker program, etc.) or manually (text editor, Excel, Open Office, etc.). The values in the file should be separated by comma, semicolon, or tab and must contain at least timecode in information. Make sure that the CSV file uses the file extension “*.csv”.

On import, the data in the CSV file will be interpreted as markers. For example, these help you to detect the exact timecode position of each audio or video clip. This is extremely useful if you want to create dubbed or synchronized audio versions of your video.

To import a CSV file, proceed as follows:

1. Create a new project. This is not strictly necessary, but helps you keep track of things.
2. Set up the project frame rate corresponding to the frame rate of the CSV file that you want to import. For CSV import, Nuendo supports the frame rates 24fps, 25fps, 29.97fps, 29.97dfps, 30fps, and 30dfps.
3. Open the File menu and select “CSV Marker...” on the Import submenu.
4. In the file dialog that opens, select the file that you want to import and click Open. The “CSV Import - Encoding” dialog opens.



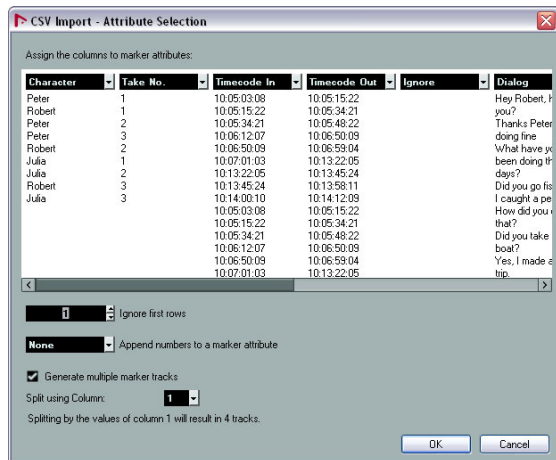
5. In the “CSV Import - Encoding” dialog, open the Encoding pop-up menu to select the encoding method of the file that you want to import. If you are not sure which encoding method was used, select the Autodetect option.

⇒ The Preview section gives you visual feedback of how Nuendo interprets the data contained in the CSV file. If the data is not displayed correctly, try another encoding method.

6. Activate one of the Separator options. The available options are: Comma (default setting), Semicolon, and Tab. Which option to choose depends on the separators used in the CSV file that you want to import.

7. Click OK to apply your settings.

The CSV Import - Attribute Selection dialog opens. Here, you can assign the columns of the CSV to several marker attributes (e.g. timecode in, timecode out, name).



8. Use the column pop-up menus to assign marker attributes.

⇒ Note that at least the attribute for timecode in has to be assigned.

9. In the “Ignore first rows” field, specify how many lines you want to exclude from import.

This is useful if your CSV file contains column headers that you want to exclude from import.

10. You can use the “Append numbers to a marker attribute” pop-up menu to add a counter, e.g. to the character attribute.

If you later sort the marker list by this attribute in the Marker window, you can quickly discern for how many takes/scenes this character is needed. Do not use this attribute to split your CSV file (see below).

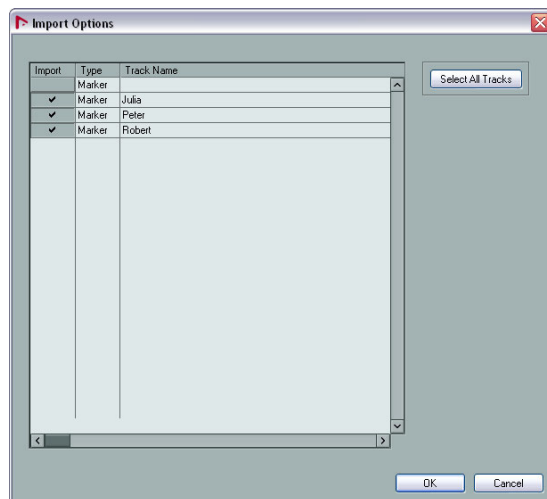
11. Activate the “Generate multiple marker tracks” option if you want the markers to be placed on different tracks.

12. Use the “Split using Column” option to specify by what column the markers are sorted.

This specifies that all lines with the same value in the “split” column are imported into the same marker track in Nuendo.

Click OK to continue.

The Import Options dialog opens.



13. In the Import Options dialog, select the tracks that you want to import by activating the corresponding tracks in the Import column to the left, or select all tracks by clicking the Select All Tracks button.

14. Click OK to import the CSV file and close the dialog.

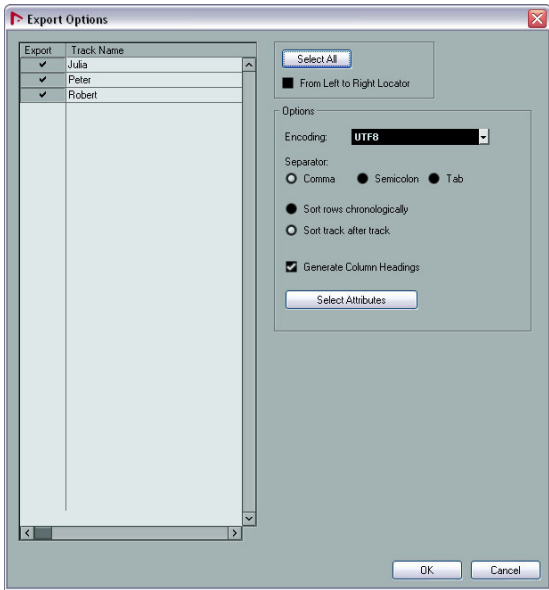
The data contained in the CSV file is imported into marker tracks in Nuendo.

Exporting markers as CSV files

You can export the markers you set up in Nuendo as CSV (Comma Separated Values) files to use them as dispositions. Dispositions are useful in recording studios, as they allow you to determine for how long a specific narrator is needed, etc. This makes it easier to calculate time and costs of a synchronization project.

To export a CSV file containing markers from Nuendo, proceed as follows:

1. Set up the markers for your project.
2. On the File menu, open the Export submenu and select “CSV Marker...”.
The Export Options dialog opens.



3. In the Export column, activate the marker tracks that you want to export.
To select all marker tracks, click the Select All button.
4. Select “From Left to Right Locator”, if you want to export only markers within the locator range.
5. Choose the desired settings in the Options section.
The following options are available:

Option	Description
Encoding	Here you can select an encoding format for your CSV file. The available formats are: UTF8, UTF16, Win-1252/Win Latin 1, MacRoman, Mac Central European, and Shift JIS.
Separator	Activate one of the options to specify the kind of separator used in your file. The available options are: Comma (default setting), Semicolon, and Tab.
Sort rows chronologically	Activate this option if you want to sort the markers according to their position on the timeline.

Option	Description
Sort track after track	Activate this option if you want to sort the markers by their track name.
Generate Column Headings	Activate this option if you want to generate column headings.

6. Click the “Select Attributes” button to open the “CSV Export - Attribute Selection” dialog where you can specify which marker attributes you want to export.
By default, all used attributes (i.e. attributes where at least one marker has a value) are exported, but you can also choose to export specific attribute categories only (see “Marker attributes” on page 139).
7. Click OK to confirm your attribute selection and close the Select Attributes dialog.
8. Click OK to export your markers as a CSV file.

Importing markers via MIDI import

You can import position markers by importing MIDI files containing markers. This is useful if you want to use your marker tracks in other projects or if you want to share them with other Nuendo users. Any markers you have added are included in the MIDI file as standard MIDI file marker events. Make sure that the “Import Markers” option is activated in the Preferences dialog (MIDI–MIDI File page).

The following settings are imported:

- The start position of position markers and cycle markers
- The track assignment of markers
- All marker tracks

⇒ If you import a standard MIDI file created in other applications, all markers are merged on one “shared” marker track.

For a description of how to import MIDI files, see “Importing MIDI files” on page 561.

Exporting markers via MIDI

You can export your markers as part of a MIDI file. If you activate “Export Markers” in the Export Options dialog, any markers are included in the MIDI file.

The following settings are exported:

- The start position of position markers and cycle markers
- The track assignment of markers
- All marker tracks

⇒ To be able to export markers via MIDI export, your project must contain at least one marker track.

For a description of how to export MIDI files, see [“Exporting MIDI files”](#) on [page 560](#).

Importing markers as part of a track archive

You can import position markers and cycle markers by importing track archives containing marker tracks. Select the tracks that you want to import in the Import Options dialog.

The following settings are imported:

- The start and end positions of cycle markers
- The track assignment of markers
- The marker IDs
- The attributes
- All marker tracks

For a description of how to import track archives, see [“Importing tracks from a track archive”](#) on [page 563](#).

Exporting markers as part of a track archive

If you want to use your marker tracks in other projects, for example to share them with other users, you can export them as part of a track archive. Select the marker tracks that you want to export and select “Selected Tracks...” from the Export submenu of the File menu.

The following settings are exported:

- The start and end positions of cycle markers
- The track assignment of markers
- The marker IDs
- The attributes
- All marker tracks

For a description of how to export tracks archives, see [“Exporting tracks as track archives”](#) on [page 562](#).

13

The Mixer

Overview



The Mixer offers a common environment for controlling levels, pan, solo/mute status, etc. for both audio and MIDI channels. Furthermore it is a convenient environment for setting up the input/output routing for multiple tracks or channels at the same time.

This chapter contains detailed information about the elements used when mixing audio and MIDI, or routing audio. You will also learn about the various ways you can configure the Mixer.

Some mixer-related features are not described in this chapter. These are the following:

- Setting up and using audio effects.
See the chapter ["Audio effects"](#) on [page 195](#).
- Setting up and using MIDI effects.
See the chapter ["MIDI realtime parameters and effects"](#) on [page 372](#).
- Surround Sound.
See the chapter ["Surround sound"](#) on [page 226](#).
- Automation of all Mixer parameters.
See the chapter ["Automation"](#) on [page 239](#).

- Mixing down several audio tracks (complete with automation and effects if you wish) to a single audio file.
See the chapter ["Export Audio Mixdown"](#) on [page 473](#).

Opening the Mixer

The Mixer can be opened in several ways:

- By selecting Mixer from the Devices menu.
 - By clicking the Mixer icon on the toolbar.
- If this icon is not visible, you need to activate the "Media & Mixer Windows" option on the toolbar context menu first.

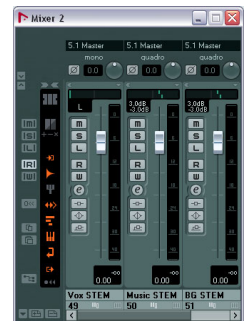


- By using a key command (by default [F3]).
 - By clicking the Mixer button in the Devices panel.
- You open the Devices panel by selecting Show Panel from the Devices menu.

Opening multiple Mixer windows

Several separate Mixer items are available on the Devices menu. These are not separate Mixers, but rather separate views of the same Mixer.

- Each of the Mixer windows can be configured to show any combination of channels, channel types, narrow and wide channel strips, etc.
- For example, you can configure one Mixer window to show MIDI channel strips, another to show input and output channels, and another to show all audio-related channels.



- You can also save channel configurations as view sets (see ["Channel view sets"](#) on [page 156](#)), which are then accessible from all Mixer windows.

⇒ All options for configuring the Mixer described in this chapter are identical for all Mixer windows.

The use of multiple Mixer windows combined with the ability to recall different Mixer configurations enables you to focus on the task at hand and keep window scrolling down to a minimum.

What channel types can be shown in the Mixer?

The following track-based channel types are shown in the Mixer:

- Audio
- MIDI
- Effect return channels (referred to as FX channels in the Project window)
- Group channels
- Instrument track channels

The order of audio, MIDI, instrument, group, and effect return channel strips (from left to right) in the Mixer corresponds to the track list in the Project window (from top to bottom). If you reorder tracks of these types in the track list, this will be mirrored in the Mixer.

In addition to the above, the following channel types are also shown in the Mixer:

- Activated ReWire channels (see the chapter [“ReWire”](#) on [page 548](#)).
- VST instrument channels (see the chapter [“VST instruments and instrument tracks”](#) on [page 215](#)).

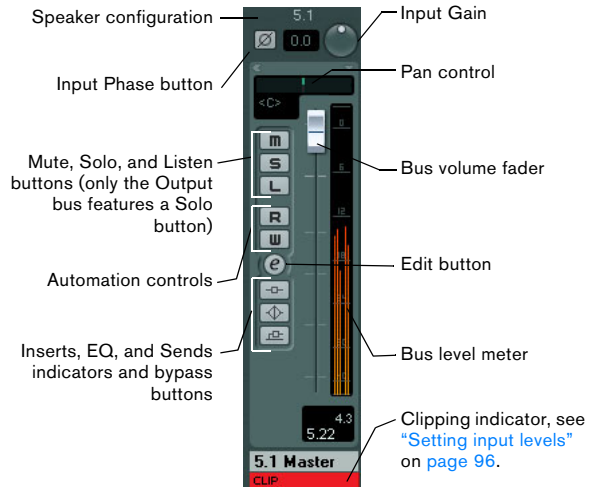
ReWire channels cannot be reordered and always appear to the right of other channels in the main Mixer pane. VST instrument (VSTi) channels can be reordered in the track list which will in turn be mirrored in the Mixer.

Input and output busses in the Mixer

The busses you set up in the VST Connections window are represented by input and output channels in the Mixer. They are shown in separate panes (to the left and right of the regular channel strips), with their own dividers and horizontal scrollbars. Input and output channel strips are very similar. The only difference between the two is that input channels have no Solo buttons and no sends.

- You can hide and show these panes by activating or deactivating the “Hide Input Channels” or “Hide Output Channels” button on the common panel (see [“The common panel”](#) on [page 154](#)).

For input and output channel strips the following controls are available:



- You can check and adjust the input level using the Input Gain knobs and/or the level fader. See [“Setting input levels”](#) on [page 96](#).

- You can change the phase of the input signal. This is done by clicking the Input Phase button next to the Input Gain control.

- You can add effects or EQ to the busses. See [“Recording with effects”](#) on [page 101](#) for an example of how to add effects to your recording at the input bus stage.

⚠ The settings you make for the input channel will be a permanent part of the recorded audio file!

- You can open the Channel Settings window to add effects or EQ.

These will affect the whole bus. Examples of effects you may want to add here include compressors, limiters and dithering, see the chapter [“Audio effects”](#) on [page 195](#).

For information on how to set up input and output busses, see the chapter [“VST Connections”](#) on [page 27](#).

How to route audio channels to busses is described in the section [“Routing audio to output busses in the Mixer”](#) on [page 169](#).

⇒ If the Control Room is disabled (see the chapter [“Control Room”](#) on [page 179](#)), the Main Mix (the default output) bus is used for monitoring. For information about Monitoring, see [“About monitoring”](#) on [page 32](#).

Configuring the Mixer

The Mixer window can be configured in various ways to suit your needs and to save screen space. You can decide which types of channels are displayed (see [“Showing/hiding channel types”](#) on [page 155](#)), and expand the view to open additional sections above the fader display (see below). On the left is the common panel which allows for global settings affecting all channels (see [“The common panel”](#) on [page 154](#)).

Normal vs. extended channel strips

While the fader panel in the Mixer is always visible, you can show/hide extended channel strips and the routing section at the top of the channel strips. The corresponding buttons can be found on the common panel on the left of the Mixer window. For details about the common panel, see [“The common panel”](#) on [page 154](#).

The fader panel shows the basic controls – faders, pan controls and an associated vertical row of buttons. The extended panel can be set to show EQs, send effects, insert effects, etc. The routing panel contains input and output routing pop-up menus (where applicable), along with Input Phase and Input Gain controls for audio-related channel strips or an Input Transformer control for MIDI channel strips.

The extended panel and the routing panel can be shown and hidden as follows:

- On the common panel, click the “Show Extended Mixer” button or the “Show Routing View” button (respectively). These options are also available on the Window submenu of the Mixer context menu.



Showing the extended Mixer panel

- On the common panel, click the “Hide Extended Mixer” button or the “Hide Routing View” button (respectively). These buttons (down arrows) are only visible when the corresponding section is open.

These options are also available on the Window submenu of the Mixer context menu.

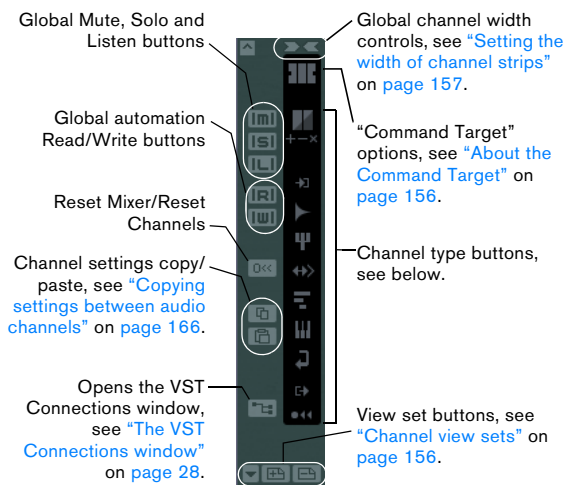


Hiding the routing panel

The common panel

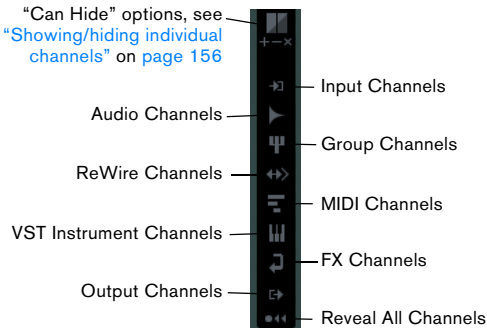
The common panel can be found on the left of the Mixer window. It contains settings for changing the look and behavior of the Mixer, as well as global settings for all channels.

In standard mode (extended view is hidden), the common panel contains the following controls:



Showing/hiding channel types

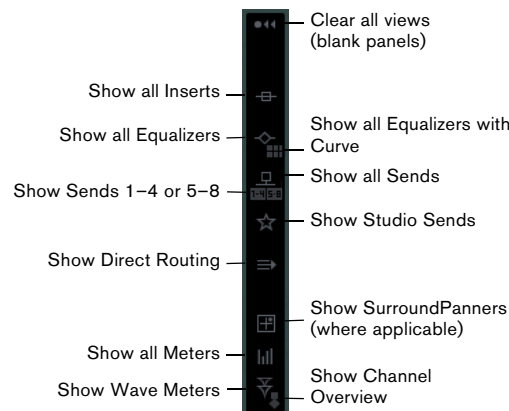
In the lower part of the common panel you will find a vertical strip with icons representing the different channel types:



- To hide or show a channel type, click the corresponding icon.
If an icon is lit (orange), the corresponding channel type is not visible in the Mixer.
- To show all hidden channel types again, click the "Reveal All Channels" button.

Configuring the extended channel strips

Using the icons in the extended area of the common panel you can determine globally what is displayed in the extended Mixer panel for all channel strips. Depending on the channel type, the following options are available:



- For a description of the options available for audio-related channels, see "Options for extended audio channel strips" on page 160. The options for MIDI channels are described in the section "Options for extended MIDI channel strips" on page 174.
- To apply the global view settings also to the input and output channels, press [Alt]/[Option] while clicking on an icon.
- To set up the extended channel strip individually for a channel, you can use the View Options pop-up menu, see below.

The View Options pop-up menu

Each channel strip in the Mixer features a View Options pop-up menu, which is used for two things:

- To determine what is shown in the extended panel for individual channels in the Mixer.
The corresponding options are only available when the extended Mixer view is open.
- To set the "Can Hide" status for individual channels in the Mixer, see below.

The View Options pop-up menu is opened by clicking the down arrow located just above the fader panel of a channel strip.

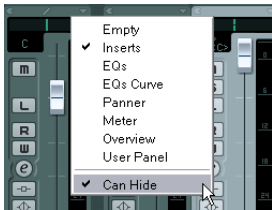


Showing/hiding individual channels

Additionally to hiding or showing channel types via the common panel, you can show or hide individual channel strips. Proceed as follows:

1. Pull down the View Options pop-up menu for a channel that you want to hide and activate the “Can Hide” option (or [Alt]/[Option]-click in the top middle section of the channel strip).

The “/” icon is shown if “Can Hide” is activated for a channel strip.



2. Repeat this for all the channels that you want to hide.
3. On the common panel, click the “Hide Channels set to ‘Can Hide’” button.

This hides all channels set to “Can Hide”. To show them again, click the button again, or click the “Reveal All Channels” button at the bottom of the common panel.



The orange color of this control on the common panel indicates that all channels set to ‘Can Hide’ are hidden from view.

Below the “Hide Channels set to ‘Can Hide’” button, there are three additional buttons. These have the following functionality:

Option	Description
Set Target Channels to ‘Can Hide’	This activates “Can Hide” for all channels that you specified as “Command Targets”, see below.
Remove ‘Can Hide’ from Target Channels	This deactivates “Can Hide” for all channels that you specified as “Command Targets”, see below.
Remove ‘Can Hide’ from All Channels	This deactivates “Can Hide” for all channels in the Mixer.

About the Command Target

Command targets let you specify which channels are affected by Mixer “commands” (all the functions that key commands can be assigned to), e.g. what to display in the extended Mixer, or the width setting of the channel strips. You can set command targets using the common panel or the context menu.



The Command Target Controls on the common panel

The following options are available:

- All Channels – Select this if you want your commands to affect all channels.
- Selected Only – Select this if you want your commands to affect the selected channels only.
- Exclude Inputs – Select this if you do not want your commands to affect the input channels.
- Exclude Outputs – Select this if you do not want your commands to affect the output channels.

Channel view sets

Channel view sets are saved configurations of the Mixer window, allowing you to quickly switch between different layouts for the Mixer. The following settings are stored in view sets:

- Settings for individual channel strips (e.g. narrow or wide mode and whether the channel strip is hidden or set to “Can Hide”).
- The global hide/show status for channel types.
- The panel hide/show status (fader panel, extended panel, routing panel).
- Configuration of the extended view.

To create a view set, proceed as follows:

1. Set up the Mixer configuration that you want to save.
2. At the bottom of the common panel, click the “Store View Set” button (the “+” sign).
3. A dialog opens, allowing you to enter a name for the view set.
4. Click OK to store the current Mixer view set.

- You can now return to this stored configuration at any time by clicking the “Select Channel View Set” button (the down arrow to the left of the “Store View Set” button) and selecting it from the pop-up menu.



- To remove a stored channel view set, select it and click the “Remove View Set” button (the “-” sign).

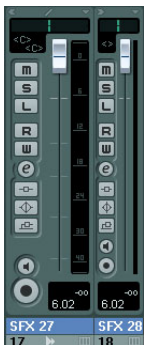
⚠ Some remote control devices support this function, which means that you can use the remote device to switch between the channel view sets.

Setting the width of channel strips

Each channel strip can be set to either “Wide” or “Narrow” mode by using the “Channel Narrow/Wide” button on the left above the fader strip.



- Narrow channel strips contain a narrow fader, miniature buttons, and the View Options pop-up menu. In the extended panel, only the Channel Overview, the Meter and the Direct Routing outputs are shown in narrow mode. (All other parameters are shown again when you return to wide mode.)



A wide and a narrow channel strip

- If you select “All targets narrow” or “All targets wide” on the common panel, all channel strips selected as command targets (see “[About the Command Target](#)” on [page 156](#)) are affected.

The Window submenu

The Mixer context menu, opened by right-clicking anywhere on the Mixer window background, contains a Window submenu. Its options are handy for quickly switching to another open Mixer window, showing/hiding the different Mixer panes, etc. It contains the following options:

- **Show Routing View**
Allows you to show/hide the topmost section of the Mixer which contains the input/output routing settings.
- **Show Extended View**
Allows you to show/hide the middle section of the Mixer, where you can display different settings for the channels (EQs, Send effects, etc.).
- **Next Mixer**
This displays the next Mixer window (if you have several Mixer windows open).

Basic mixing procedures

Setting volume in the Mixer

In the Mixer, each channel strip has a volume fader.

- For audio channels, the faders control the volume of the channels before they are routed (directly or via a group channel) to an output bus.
- Each channel can in turn handle up to 12 speaker channels – see the chapter “[Surround sound](#)” on [page 226](#).

- An output channel fader determines the master output level of all audio channels routed to that output bus.
- MIDI channels handle fader volume changes in the Mixer by sending out MIDI volume messages to the connected instrument(s).
Connected instruments must be set to respond to MIDI messages (such as MIDI volume in this case) for this to function properly.

- The fader settings are displayed numerically below the faders, in dB for audio-related channels and as MIDI volume (0 to 127) for MIDI channels.

You can click in the fader value fields and type in a new volume value.

- To make fine volume adjustments, hold down [Shift] when you move the faders.
- If you hold down [Ctrl]/[Command] and click on a fader, it is reset to its default value, i.e. to 0.0dB for audio-related channels, or to 100 for MIDI channels.
Most Mixer parameters can be reset to their default values like this.

You can use the faders to set up a volume balance between the audio and MIDI channels, and perform a manual mix by moving the faders and other controls while playing back. Using the Write function (see [“Enabling and disabling the writing of automation data”](#) on page 240), you can automate the levels and most Mixer actions.

⚠ It is also possible to create volume envelopes for separate events in the Project window or Audio Part Editor (see [“Event envelopes”](#) on page 121), or to make static volume settings for an event on the info line or with the volume handle (see [“About the volume handle”](#) on page 114).

About the level meters for audio channels

When playing back audio in Nuendo, the level meters in the Mixer show the level of each audio channel.

- Directly below the level meter is a small level readout – this shows the highest registered level in the signal. Click this to reset the peak levels.

- Peak levels can also be shown as static horizontal lines in the meter, see [“Changing the meter characteristics”](#) on page 167.

⇒ Nuendo uses 32 bit floating point processing internally, so there is virtually limitless headroom – signals can go way beyond 0dB without clipping. Having higher levels than 0dB for individual audio channels is therefore not a problem in itself. The audio quality will not be degraded by this.

However, when many high level signals are mixed in an output bus, this may require that you lower the output channel level a lot (see below). Therefore it is good practice to keep the maximum levels for individual audio channels roughly around 0dB.

⚠ When Direct Monitoring is used and the “Map input bus metering to Audio track (in Direct Monitoring)” option is activated in the Preferences dialog (VST–Metering page), the level meters in the Mixer show the level of the input bus instead.

About the level meters for input and output channels

Input and output channels have clipping indicators.

- When you are recording, clipping can occur when the analog signal is converted to digital in the audio hardware. It is also possible to get clipping in the signal being recorded to disk (when 16 or 24 bit record format is used and you have adjusted the Mixer settings for the input channel). For more information, see [“Setting input levels”](#) on page 96.

- In the output busses, the floating point audio is converted to the resolution of the audio hardware. In the integer audio domain, the maximum level is 0dB – higher levels cause the clipping indicator for each bus to light up.

If the clipping indicators light up for a bus, this indicates actual clipping – digital distortion which is to be avoided.

⚠ If the clipping indicator lights up for an output channel, lower the level until the indicator is no longer lit.

About the Input Gain control



Each audio-related channel and input/output channel features an Input Gain knob. It controls the gain for the incoming signal, before EQ and effects.

The Input Gain knob is not meant to be used as a volume control in the Mixer, as it is not suited for continuous level adjustments during playback. However, it can be used to cut or boost the gain. This is useful in the following circumstances:

- To change the level of a signal before the effects section.

The level going into certain effects can change the way the signal is affected. A compressor, for example, can be “driven” harder by raising the input gain.

- To boost the level of poorly recorded signals.

To change the input gain value, you need to press [Shift] before you can adjust the control (that way accidental gain changes are avoided). If you press [Alt]/[Option], you can adjust the Input Gain using a fader. Alternatively, you can directly enter a new value in the value field.

About the Input Phase control



Each audio-related channel and input/output channel has an Input Phase button (to the left of the Input Gain control). When this button is activated, the phase polarity is inverted for the signal. Use this to correct for balanced lines and mics that are wired backwards, or mics that are “out of phase” due to their positioning.

- Phase polarity is important when mixing together two similar signals.

If the signals are “out of phase” with respect to one another, there will be some cancellation in the resulting audio, producing a hollow sound with less low-frequency content.

Level meters for MIDI channels

The level meters for MIDI channels do not show actual volume levels. Instead, they indicate the velocity values of the notes played back on MIDI tracks.

MIDI tracks set to the same MIDI channel and output

If you have several MIDI tracks set to the same MIDI channel (and routed to the same MIDI output), making volume and pan settings for one of these MIDI tracks/Mixer channels also affects all other Mixer channels set to the same MIDI channel/output combination.

Using Solo and Mute

You can use the Mute and Solo buttons to silence one or several channels.



The following applies:

- The Mute button silences the selected channel. Clicking the Mute button again unmutes the channel. Several channels can be muted simultaneously. Muting group channels can have two different results depending on how the Preferences are set (see [“Settings for group channels”](#) on [page 170](#)).



A muted channel in the Mixer.



A lit Global Mute icon on the common panel shows that one or more channels are muted.

- Clicking the Solo button for a channel mutes all other channels.

A soloed channel is indicated by a lit Solo button, and also by the lit Global Solo icon on the common panel. Click the Solo button again to turn off Solo.

- Several channels can be soloed at the same time.

However, if you press [Ctrl]/[Command] and click the Solo button for a channel, any other soloed channels are automatically un-soloed (i.e. this Solo mode is exclusive).

- [Alt]/[Option]-clicking a Solo button activates “Solo Defeat” for that channel.

In this mode the channel will not be muted if you solo another channel. To turn off Solo Defeat, [Alt]/[Option]-click the Solo button again.

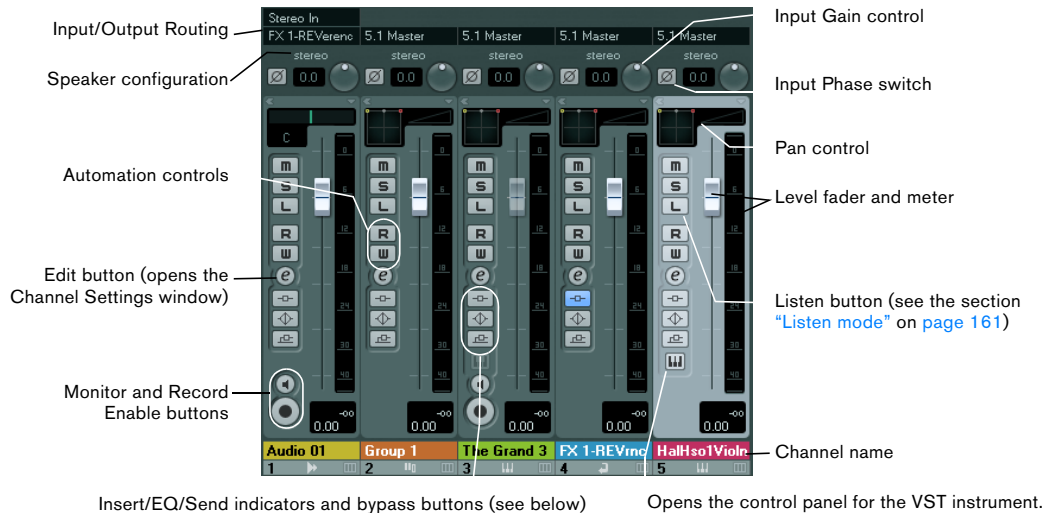


Solo Defeat is activated for this channel.

- You can un-mute or un-solo all channels simultaneously by clicking the Global Mute or Global Solo icon on the common panel.

Audio-specific procedures

This section describes the options and basic procedures regarding audio channels in the Mixer. The following graphic shows different types of (non-extended) audio-related channels (from left to right): an audio track, a group channel, an instrument track, an FX channel, and a VST instrument channel:



All audio-related channel types (audio, instrument track, group, effect return, VST instrument, and ReWire) have the same channel strip layout, with the following exceptions:

- Only audio track channels have an Input Routing pop-up menu.
- Only audio and instrument track channels have Monitor and Record Enable buttons.
- Instrument track and VST instrument channels have an additional button for opening the instrument's control panel.

About the Insert/EQ/Send indicators and bypass buttons

The three buttons in each audio channel strip have the following functionality:

- If an insert or send effect, or an EQ module is activated for a channel, the corresponding button is lit. The effect indicator buttons are blue, and the EQ indicator buttons are green.

- If you click any of these buttons when lit, the corresponding EQ or effects section is bypassed. Bypass is indicated by the color yellow. Clicking the button again deactivates bypass.

Options for extended audio channel strips

When using the extended view (see ["Normal vs. extended channel strips"](#) on [page 154](#)), the upper panel can be set to show different views for each audio-related channel strip. You can select what to display in the extended panel individually for each channel or globally for all channels.

The following views are available:

- A blank panel ("Empty").
 - The Inserts section, with 8 effect pop-up menus, a bypass and an edit button.
- The inserts can also be found in the Inspector and the Channel Settings window, see ["Using Channel Settings"](#) on [page 163](#).

- The EQ section, either with value sliders (“EQs”) or as numerical settings with a curve display (“EQs curve”). These two views have exactly the same controls but different graphic layouts. The EQ section is also available in the Channel Settings window. For EQ parameter descriptions, see [“Making EQ settings”](#) on [page 164](#).

- The Sends section, with 8 effect pop-up menus and send level value sliders. The sends can also be found in the Inspector and the Channel Settings window, see [“Using Channel Settings”](#) on [page 163](#).

- You also have the option of displaying four sends at a time (the Sends 1–4 and 5–8 menu items). These modes offer the additional benefit of displaying send levels as dB values.

- The Panner section (where applicable). If the channel is routed to a surround bus, you can view a compact version of the SurroundPanner in the extended panel. Double-click on it to open the full SurroundPanner panel. If the Mixconvert plug-in is inserted and active, its controls are displayed in this section instead.

- The Meter section. Select the Meter option to view large level meters in the extended panel. These operate exactly like the regular meters.

- The Overview section. Select the Overview option if you want to know which insert effects, EQ modules, and send effects are activated for the channel. You can click the On/Off buttons to activate and deactivate the corresponding insert effect, EQ module, or send effect.

- The User Panel section. Select the User Panel option to view the available device panels for the audio track, including panels for inserted VST effects, see [“Audio tracks”](#) on [page 43](#). You can access the available panels via the User pop-up menu in the extended Mixer panel. For information on device panels, see the separate PDF document “MIDI Devices”.

- The Studio Sends section. Select the Studio Sends option if you want to view the available studio sends. This section is only available if the Control Room is enabled, see the chapter [“Control Room”](#) on [page 179](#).

- The Direct Routing section. Select the Direct Routing option to view 7 additional output destination slots. For more information, see [“Direct Routing”](#) on [page 171](#).

- The Wave Meters display. Select the Wave Meters option to display a vertically scrolling waveform in the extended Mixer panel. The scrolling speed depends on the disk preload time set in the Device Setup dialog (VST Audio System page). With preload times under 4 seconds, the scrolling speed increases.

⇒ In narrow mode, only the Channel Overview, the Meter, and the Direct Routing sections can be shown in the extended channel strip. If you have selected any of the other options, the Channel Overview is displayed in narrow mode. When you switch back to wide mode, the corresponding settings become available again.

Listen mode

Additionally to the Solo/Mute functions, which affect the actual mix, Nuendo features a Listen function. It allows you to quickly check the signal coming from selected channels without interrupting and interfering with the actual mix.

For example, during a recording session this allows the sound engineer in the control room to attenuate the signal coming from one of the musicians while the recording continues undisturbed.

In the Control Room Mixer you can enable/disable the Listen function for the Phones and Control Room channels, decide whether the signal is read pre-fader or post-fader, and hear the signals from the listen-enabled channels in context by adding a dimmed version of the mix signal. For more information about the functions available in the Control Room Mixer, see [“The Control Room Mixer”](#) on [page 184](#).

In the Mixer you can listen-enable any track by activating the corresponding Listen button:

- Clicking the Listen button for a channel routes that channel to the Control Room without interrupting the normal signal flow. A listen-enabled channel is indicated by a lit Listen button, and also by the lit global Listen button on the common panel.



The Listen button for a channel strip and the global Listen button on the common panel

- Click the Listen button again to turn off Listen mode. You can also turn off Listen mode for all listen-enabled tracks at the same time by clicking the global Listen button on the common panel.

⇒ In the Key Commands dialog (Mixer category) you can also set up a key command to enable/disable Listen for a channel (see [“Key commands”](#) on [page 580](#)).

Setting pan in the Mixer

For each audio-related channel with at least a stereo output configuration you will find a miniature pan control at the top of the channel strip. This control is different for stereo and surround configurations.

Panning channels with a stereo output configuration

The pan control at the top of stereo audio channel strips is used to position a channel in the stereo spectrum.



The stereo pan control

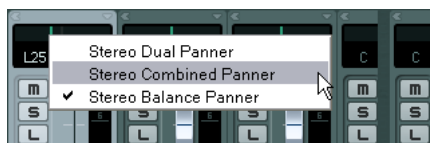
The following applies when using the pan control:

- To make fine pan adjustments, hold down [Shift] when you move the pan control.
- To select the (default) center pan position, hold down [Ctrl]/[Command] and click on the pan control.
- To view the pan settings in a separate window, where you can change the settings using sliders, double-click on the pan control.

About the three stereo pan modes

By default, stereo pan controls the balance between the left and right channels. However, if you want to set pan independently for the left and right channel, you can select a different pan mode.

If you right-click in the pan control field for a stereo audio channel, you can select one of three pan modes:



- Stereo Balance Panner controls the balance between the left and right channels.

This is the default mode.

- If Stereo Dual Panner is selected, there will be two pan controls with the upper controlling pan for the left channel, and the lower controlling pan for the right channel.

This allows you to set pan independently for the left and right channels. Note that it is possible to reverse the left and right channels, i.e. the left channel can be panned to the right and vice versa. You can also “sum” two channels by setting them to the same pan position (i.e. mono). However, this will increase the volume of the signal.



- If Stereo Combined Panner is selected, the left and right pan positions are shown as two lines with a blue/gray area between them.

In this mode, the left and right pan controls are linked, and can be moved left and right like a single pan control (keeping their relative distance).



In Stereo Combined mode you can also set the pan independently for the left and right channels. This is done by holding down [Alt]/[Option] and dragging the corresponding pan control.

⇒ If you reverse the left and right channels, the area between the pan controls is red instead of blue/gray.

When moving combined pan controls so that the left or right pan control reaches its maximum pan value, it naturally cannot go any further. If you continue to move further in the same direction, only the other pan control will move, thus altering the set relative pan range until both channels are panned fully to one side. If you move the pan controls in the opposite direction without releasing the mouse, the previously set pan range will be restored.

⇒ The pan settings made with the Dual Panner are reflected in the Combined Panner and vice versa.

⇒ You can specify the default pan mode for inserted audio tracks in the Preferences dialog (VST page).

About the “Stereo Pan Law” setting

In the Project Setup dialog you will find a pop-up menu named “Stereo Pan Law”, which allows you to select one of several pan modes. These modes are required for power compensation. Without power compensation, the power of the sum of the left and right side is higher (louder) if a channel is panned center than if it is panned left or right.

To remedy this, the Stereo Pan Law setting allows you to attenuate signals panned center, by -6, -4.5 or -3dB (default). Selecting the 0dB option effectively turns off constant-power panning. Experiment with the modes to see which fits best in a given situation. You can also select “Equal Power” on this pop-up menu, which means that the power of the signal will remain the same regardless of the pan setting.

Panning multi-channel audio

Channels with a multi-channel output configuration feature a miniature SurroundPanner control at the top of the channel strip. For further information on multi-channel audio and the SurroundPanner V5, see the chapter “[Surround sound](#)” on [page 226](#).

Panning Bypass

You can bypass the panning for all audio-related track types. To do this, press [Shift]–[Alt]/[Option] and click on the pan setting for the respective channel (on the fader panel or in the extended Mixer view). The Panning Bypass state is reflected in all the different pan setting sections, e.g. if you bypass a channel in the Mixer, this is automatically reflected in the Inspector for the respective track.

When panning is bypassed for a channel, the following happens:

- Mono channels are panned center.
- Stereo channels are panned left and right.
- Surround channels are panned center.

⇒ To deactivate Panning Bypass, simply press [Shift]–[Alt]/[Option] and click again.

Using Channel Settings

For each audio channel strip in the Mixer and in the Inspector and track list for each audio track, there is an Edit button (“e”).

Clicking this opens the VST Audio Channel Settings window. By default, this window contains:

- A section with eight insert effect slots (see “[Audio effects](#)” on [page 195](#)).
- Four EQ modules and an associated EQ curve display (see “[Making EQ settings](#)” on [page 164](#)).
- A section with eight sends (see “[Audio effects](#)” on [page 195](#)).
- A duplicate of the Mixer channel strip (without the extended panel but with the input and output settings panel).

You can customize the Channel Settings window, by showing/hiding the different panels and/or by changing their order:

- To specify which panels are shown or hidden, right-click in the Channel Settings window, and activate/deactivate the corresponding options on the Customize View submenu of the context menu.
- To change the order of the panels, select “Setup...” on the Customize View pop-up menu and use the “Move up” and “Move Down” buttons.

⇒ For further information, see the chapter “[Customizing](#)” on [page 570](#).

Every channel has its own Channel Settings window (although you can view each in the same window if you like – see below).



Click the Edit button to open the Channel Settings window.



The Channel Settings window in its default configuration is used for the following operations:

- Apply equalization, see [“Making EQ settings”](#) on page 164.
- Apply send effects, see [“Audio effects”](#) on page 195.
- Apply insert effects, see [“Audio effects”](#) on page 195.
- Copy channel settings and apply them to another channel, see [“Copying settings between audio channels”](#) on page 166.

⚠ All channel settings are applied to both sides of a stereo channel.

Changing channels in the Channel Settings window

You can view any channel's settings from a single window.

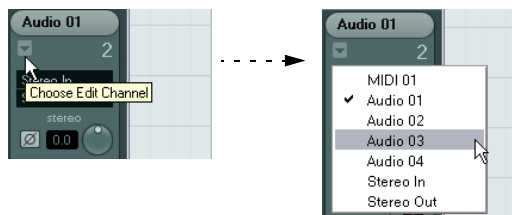
If the “Sync Project and Mixer Selection” option is activated in the Preferences dialog (Editing—Project & Mixer page), this can be done “automatically”:

- Open the Channel Settings window for a track and position it so that you can see both the Project window and the Channel Settings window.

Selecting a track in the Project window automatically selects the corresponding channel in the Mixer (and vice versa). If a Channel Settings window is open, this will immediately switch to show the settings for the selected channel. This allows you to have a single Channel Settings window open in a convenient position on the screen, and use it for all your EQ and channel effect settings.

You can also select a channel manually (thereby changing what is shown in the open Channel Settings window). Proceed as follows:

1. Open the Channel Settings window for any channel.
2. Open the “Choose Edit Channel” pop-up menu by clicking the arrow button to the left of the channel number at the top of the Fader view.



3. Select a channel from the pop-up menu to show the settings for that channel in the open Channel Settings window.

- Alternatively, you can select a channel in the Mixer by clicking its channel strip (make sure not to click on a control as this will change the respective parameter setting instead).

This selects the channel, and the Channel Settings window is updated.

- To open several Channel Settings windows at the same time, press [Alt]/[Option] and click the Edit buttons for the respective channels.

Making EQ settings

Each audio channel in Nuendo has a built-in parametric equalizer with up to four bands. There are several ways to view and adjust the EQs:

- By selecting one of the EQ display modes (“Show All Equalizers” or “Show All Equalizers with Curve”) for the extended channel strip in the Mixer. These modes contain the same settings but present them in different ways:

In “Show All Equalizers” mode, the top value slider controls the gain, the middle controls frequency and the lower sets the filter type and the Q parameter for each EQ band.



In “Show All Equalizers with Curve” mode, EQ settings are shown as a curve. Parameters are set by clicking on the value and adjusting with the fader that appears.

- By selecting the Equalizers or Equalizer Curve tab in the Inspector.

The Equalizers section is similar to the EQs mode in the extended Mixer or the Equalizers section in the Channel Settings window, while the Equalizer Curve section shows a display in which you can “draw” an EQ curve. Setting EQ in the Inspector is only possible for track-based audio channels.

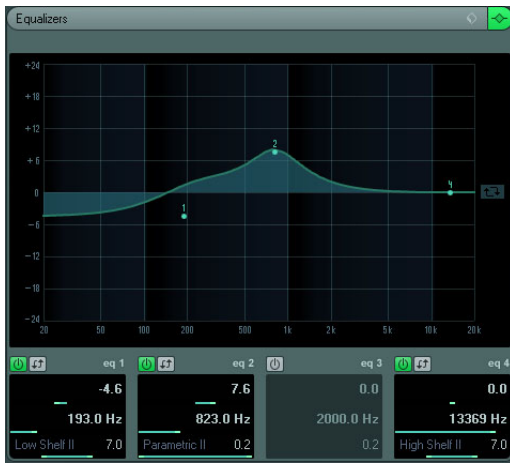
- ⇒ By default, only the Equalizers tab is shown. To display the Equalizer Curve tab, right-click on an Inspector tab (not in the empty area below the Inspector) and activate the Equalizer Curve option.

- By using the Channel Settings window.

This offers both parameter sliders and a clickable curve display (the Equalizer + Curve pane) and also lets you store and recall EQ presets.

Below we describe how to set up EQ in the Channel Settings window, but the parameters are the same in the Mixer and Inspector (apart from the presets and reset function, which are not available in the Mixer).

The Equalizers + Curve pane in the Channel Settings window consists of four EQ modules with parameter sliders, an EQ curve display and some additional functions at the top.



Using the parameter controls

1. Activate an EQ module by clicking its On/Off button. Although the modules have different default frequency values and different Q names, they all have the same frequency range (20Hz to 20kHz). The only difference between the modules is that you can specify different filter types for each individual module (see below).
2. Set the amount of cut or boost with the gain control – the upper slider. The range is ± 24 dB.
3. Set the desired frequency with the frequency slider. This is the center frequency of the frequency range (20Hz to 20kHz) to be cut or boosted.
4. Click on the filter name above the bottom slider and select a filter type from the pop-up menu. The “eq1” and “eq4” bands can act as parametric, shelving, or high/low-pass filters, while “eq2” and “eq3” will always be parametric filters.
5. Set the Q value with the bottom slider. This determines the width of the affected frequency range. Higher values give narrower frequency ranges.

6. To invert an EQ band (i.e. reflect the curve along the x axis), click the Inverse button to the right of its On/Off button. This button is hidden when the EQ module is deactivated.

This is very useful if you want to filter out unwanted noise. While looking for the frequency to omit, it sometimes helps to boost it in the first place (set the filter to positive gain). After you have found it, you can use the Inverse button to cancel it out.

7. If needed, you can activate and make settings for up to four modules.

- Note that you can edit the values numerically as well, by clicking in a value field and entering the desired gain, frequency, or Q value.

Using the curve display

When you activate EQ modules and make settings, you will see that your settings are automatically reflected in the curve display above. You can also make settings directly in the curve (or combine the two methods any way you like):

1. To activate an EQ module, click in the curve display. This adds a curve point and one of the modules below is activated.
2. Make EQ settings by dragging the curve point in the display. This allows you to adjust gain (drag up or down) and frequency (drag left or right).
3. To set the Q parameter, press [Shift] and drag the mouse up or down. You will see the EQ curve become wider or narrower as you drag.
 - You can also restrict the editing by pressing [Ctrl]/[Command] (sets gain only) or [Alt]/[Option] (sets frequency only) while you drag the curve point.
4. To activate another EQ module, click somewhere else in the display and proceed as above.
5. To turn off an EQ module, double-click its curve point or drag it outside the display.
6. To invert the EQ curve (i.e. reflect it along the x axis), click the Inverse Equalizers button to the right of the curve display.



EQ bypass

Whenever one or several EQ modules are activated for a channel, the EQ button lights up in green in the Mixer channel strip, Inspector (Equalizer and Channel sections), track list, and Channel Settings window (top right corner of the EQ section).

You can also bypass all EQ modules. This is useful, as it allows you to compare the sound with and without EQ. Proceed as follows:

- In the Mixer, the track list and in the Channel section in the Inspector, click the EQs state button so that it turns yellow.

To deactivate EQ bypass, click the button again, so that it turns green again.

- In the Inspector (Equalizers tab) and in the Channel Settings window, click the Bypass button (next to the EQ button) so that it turns yellow.

Click again to deactivate EQ bypass mode.



Left: EQ bypass in the Mixer; Right: EQ bypass in the Channel Settings window or the Inspector

EQ reset

On the Presets pop-up menu in the Channel Settings window and in the Inspector, you will find the Reset command. Select this to turn off all EQ modules and reset all EQ parameters to their default values.

Using EQ presets

Some useful basic presets are included with the program. You can use them as they are, or as a starting point for further “tweaking”.

- To call up a preset, pull down the presets pop-up menu in the Channel Settings window or in the Inspector and select one of the available presets.
- To store the current EQ settings as a preset, select “Save Preset...” from the Presets pop-up menu and enter the desired name for the preset in the dialog that opens.

- To rename the selected preset, select “Rename Preset” on the pop-up menu and enter a new name.
- To delete the selected preset, select “Remove Preset” on the pop-up menu.

⇒ You can also apply EQ (and Inserts) settings from track presets, see [“Applying inserts and EQ settings from track presets”](#) on [page 359](#).

EQ in the channel overview

If the Channel section is selected in the Inspector or if the Overview section is displayed in the extended Mixer view, you will get an overview of which EQ modules, insert effects and sends are activated for the channel.

By clicking on any of the module numbers (1 to 4), you can turn the corresponding EQ module on or off.



The channel overview in the extended Mixer view

Copying settings between audio channels

It is possible to copy all channel settings for an audio channel and paste them to one or several other channels. This applies to all audio-based channel types. For example, you can copy EQ settings from an audio track and apply these to a group or VST instrument channel, if you want them to have the same sound.

Proceed as follows:

1. In the Mixer, select the channel you want to copy settings from.
2. On the common panel, click the “Copy First Selected Channel’s Settings” button.



3. Select the channel(s) you want to copy the settings to and click the “Paste Settings to Selected Channels” button (below the “Copy First Selected Channel Settings” button).

The settings are applied to the selected channel(s).

You can copy channel settings between different types of channels, but only those channels will be used for which corresponding settings are available in the target channel:

- For example, since input/output channels do not have send effects, copying from them will leave the sends settings in the target channel unaffected.
- Also, in case of surround sound, any insert effects routed to surround speaker channels become muted when the settings are pasted to a mono or stereo channel.

Initialize Channel and Reset Mixer

The Initialize Channel button can be found in the lower part of the Control Strip section in the Channel Settings window. (If this section is not shown in the Channel Settings window, open the context menu and select “Control Strip” on the Customize View submenu.) Initialize Channel resets the selected channel to the default settings.

Similarly, the Mixer common panel holds a Reset Mixer/Reset Channels button. When you click this, you will be asked whether you want to reset all channels or just the selected channels.

The default settings are:

- All EQ, insert and send effect settings are deactivated and reset.
- Solo/Mute is deactivated.
- The fader is set to 0dB.
- Pan is set to center position.

Changing the meter characteristics

On the Mixer context menu, there is a submenu named “Global Meter Settings”. Here you can make settings for the preferred meter characteristics, with the following options:

- If Hold Peaks is activated, the highest registered levels are “held” and are shown as static horizontal lines in the meter.

Note that you can turn this on or off by clicking in any audio level meter in the Mixer.



Hold Peaks is activated. The highest registered level is displayed in the meter.

- If Hold Forever is activated, the peak levels are shown until meters are reset (by clicking the numerical peak display below the meter).

If Hold Forever is off, you can use the parameter “Meters’ Peak Hold Time” in the Preferences dialog (VST–Metering page) to specify for how long the peak levels will be held. The peak hold time can be between 500 and 30000ms.

- If Meter Input is activated, meters show input levels for all audio channels and input/output channels.

Note that the input meters are post input gain.

- If “Meter Post-Fader” is activated, meters show post-fader levels.

This is the default setting for channels in the Mixer.

- There is also a “Meter Post-Panner” mode.

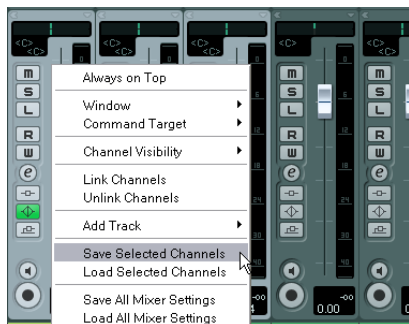
This is similar to “Meter Post-Fader”, but the meters will reflect pan settings as well.

- If Fast Release is activated, the meters respond very quickly to level peaks. If Fast Release is deactivated, the meters respond more like standard meters.

You can set the time it takes for the meters to “fall back” in the Preferences dialog (VST–Metering page).

Saving and loading Mixer settings

It is possible to save complete Mixer settings for all or all selected audio-related channels in the Mixer. These can later be loaded into any project. Channel settings are saved as Mixer settings files. These have the file extension “.vmx”.



Saving selected channels or all Mixer settings

Right-clicking somewhere in the Mixer panel or in the Channel Settings window brings up the context menu where the following Save options can be found:

- “Save Selected Channels” will save all channel settings for the selected channels.
Input/output routing is not saved.
- “Save All Mixer Settings” saves all channel settings for all channels.

When you select any of the above options, a standard file dialog opens where you can select a name and storage location on your disk for the file.

Loading selected channels

To load Mixer settings saved for selected channels, proceed as follows:

1. Select the same number of channels as when you saved your Mixer settings.
 - The Mixer settings are applied in the same order as they were saved.
For example, if you save the settings for channels 4, 6 and 8, and apply these settings to channels 1, 2 and 3, the settings saved for channel 4 are applied to channel 1, the settings saved for channel 6 to channel 2, and so on.

2. Open the Mixer context menu and select “Load Selected Channels”.

A standard file dialog opens, allowing you to locate the saved file.

3. Select the file and click Open.

The channel settings are applied to the selected channels.

⚠ When applying Mixer settings to fewer channels than Mixer settings available in the saved file, some of the saved settings are not needed and will be “left over”. Since the saved settings are applied from “left to right” (as shown in the Mixer), the settings for the channels furthest to the right are the ones that are not applied to any channels.

Loading all Mixer settings

Selecting “Load All Mixer Settings” from the context menu allows you to open a saved Mixer settings file, and have the stored settings applied to all channels for which information is included in the file. All channels, output settings, VST instruments, sends and “master” effects will be affected.

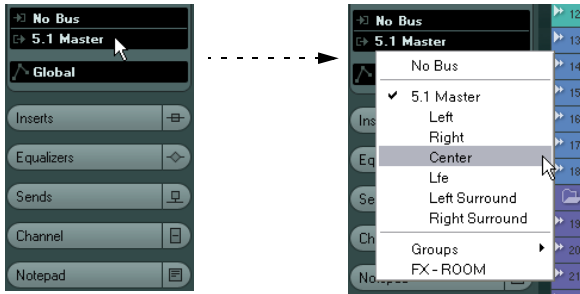
⚠ This function does not automatically add channels! For example, if the saved Mixer settings are for 24 channels, and the Mixer you apply it to contains 16 channels, only the settings for channels 1 to 16 are applied.

Routing

When you play back an audio track (or any other audio-related channel), you route it to an output bus. In the same way, when you record on an audio track you select from which input bus the audio is received.

The input and output routing for a channel can be set up via the Inspector or the Mixer. For large projects, it is convenient to use the Mixer for this, since it allows you to set inputs and outputs for multiple channels at the same time. In postproduction projects it might even be necessary to send signals to several outputs at once. This can easily be achieved using the Direct Routing features, see [“Direct Routing” on page 171](#).

- In the Inspector, you can select input and output busses using the Input and Output Routing pop-up menus.



- In the Mixer, you can select busses in the routing panel at the top of each channel strip. For more information about the routing panel, see [“Normal vs. extended channel strips”](#) on [page 154](#).



- If you press [Shift]-[Alt]/[Option] and select an input or output bus in the track list or the routing panel in the Mixer, it will be chosen for all selected channels. This makes it easy to quickly set several channels to use the same input or output. Similarly, if you press [Shift] and select a bus, the following selected channels will be set to use incrementing busses – the second selected channel will use the second bus, the third will use the third bus and so on.

⇒ For audio-related channel types other than audio track channels (i.e. VST instrument channels, ReWire channels, group channels, and FX channels), only the Output Routing pop-up menu is available.

When selecting an input bus for a track you can only select busses that correspond to the track's channel configuration. Here are the details for input busses:

- Mono tracks can be routed to mono input busses or individual channels within a stereo or surround input bus.
- Mono tracks can be routed to External Inputs configured on the Studio tab of the VST Connections window. These can be mono or individual channels within a stereo or surround bus. They can also be routed to the Talkback input.
- Mono tracks can also be routed to mono output busses, mono group output busses or mono FX channel output busses, provided that these will not lead to feedback.

- Stereo tracks can be routed to mono input busses, stereo input busses or stereo child busses within a surround bus.
- Stereo tracks can be routed to External Inputs that are configured in the Studio tab of the VST Connections window. These can be mono input busses or stereo input busses. They can also be routed to the Talkback input.
- Stereo tracks can also be routed to mono or stereo output busses, mono or stereo group output busses and mono or stereo FX channel output busses, provided that these will not lead to feedback.
- Surround tracks can be routed to surround input busses.
- Surround tracks can be routed to External Inputs that are configured in the Studio tab of the VST Connections window, provided that these have the same input configuration.
- Surround tracks can also be routed to output busses, provided that these have the same input configuration or will not lead to feedback.

For output busses any assignment is possible.

⚠ Assignments that will lead to feedback are not available in the pop-up menu. This is also indicated by a one-way symbol.

To disconnect input or output bus assignments, select “No Bus” from the corresponding pop-up menu.

Routing audio to output busses in the Mixer

Output busses let you route audio from the program to the outputs on your audio hardware. To route the output of an audio channel to one of the active busses, proceed as follows:

1. Make sure that the routing panel is visible (see [“Normal vs. extended channel strips”](#) on [page 154](#)).
2. Pull down the Output Routing pop-up menu at the top of the channel strip and select one of the busses.

This pop-up menu contains the output busses configured in the VST Connections window, as well as available group channels (provided that the busses and groups are compatible with the speaker configuration for the channel – see [“Routing”](#) on [page 168](#)).

For details on routing surround channels, see [“Routing”](#) on [page 229](#).

⇒ You can also create sends that can be routed to other output channels. This can be useful when creating quick headphone mixes from the current monitor mix or to create a downmix of a surround mix. This is done by creating a send from the current monitor output bus, assigned to another output bus connected to a headphone amplifier.

Using group channels

You can route the outputs from multiple audio channels to a group. This enables you to control the channel levels using one fader, apply the same effects and equalization to all the channels, etc.

For example, group channels can be used as “effect racks” (see the chapter [“Audio effects”](#) on [page 195](#)) or for pre-mixing purposes (i.e. stems) in a postproduction scenario (see [“Direct Routing”](#) on [page 171](#)).

To set up a group channel, proceed as follows:

1. Pull down the Project menu, open the Add Track sub-menu and select the “Group Channel...” option.

2. Select the desired channel configuration and click the Add Track button.

A group channel track is added to the track list and a corresponding group channel strip is added to the Mixer. By default, the first group channel strip is labeled “Group 1”, but you can rename it just like any channel in the Mixer.

3. Pull down the Output Routing pop-up menu for a channel you want to route to the group channel, and select the group channel.

The output of the audio channel is now redirected to the selected group.

4. Do the same for the other channels you wish to route to the group.

⚠ You can select a group channel as input for an audio track, e.g. to record a downmix of separate tracks (see [“Recording from busses”](#) on [page 95](#)).

Settings for group channels

The group channel strips are almost identical to audio channel strips in the Mixer. The descriptions of the Mixer features earlier in this chapter apply to group channels as well. Some things to note:

- You can route the output of a group to an audio channel (see [“Recording from busses”](#) on [page 95](#)), to an output bus or to another group.

You cannot route a group to itself.

- There are no Input Routing pop-up menus, Monitor buttons or Record Enable buttons for group channels.

- Solo functionality is automatically linked for channels routed to a group and the group channel itself.

This means that if you solo a group channel, all channels routed to the group are automatically soloed as well. Similarly, soloing a channel routed to a group will automatically solo the group channel.

- Mute functionality depends on the “Group Channels: Mute Sources as well” setting in the Preferences dialog (VST page).

By default, when you mute a group channel, no audio will pass through the group. However, other channels that are routed directly to that group channel will remain unmuted. If any of those channels have aux sends routed to other group channels, FX channels or output busses, those will still be heard.

If the “Group Channels: Mute Sources as well” option is activated in the Preferences dialog (VST page), muting a group channel will cause all other channels directly routed to it to be muted as well. Clicking the Mute button again will unmute the group channel and all other channels directly routed to it. Channels that were muted prior to the group channel being muted will not remember their mute state and become unmuted with the group channel.

⚠ The “Group Channels: Mute Sources as well” option does not affect how mute automation is written. Writing mute automation for a group channel only affects the group channel and not the channels routed to it. When writing automation, you will see the other channels being muted as well upon muting a group channel. However, during playback, only the group channel will respond to the automation.

Direct Routing

In large postproduction projects, a lot of time and effort has to go into the routing of individual tracks, group channels, etc. The Direct Routing features of Nuendo help you to set up your routing easily and quickly. They allow you to switch the destination of channels “on the fly” (for example, if a track containing sound effects is temporarily to be routed to the dialogue stem), and to create different mix versions (such as full and M+E) in one go, thus saving you the time to start the mixdown process twice.

Rather than having to adjust the routing destinations individually for each channel, you can use the Direct Routing panel in the Mixer to set and activate outputs for all selected channels at once. The Direct Routing features are available for audio-related tracks (audio, instrument, and FX channel tracks), groups, and output busses.

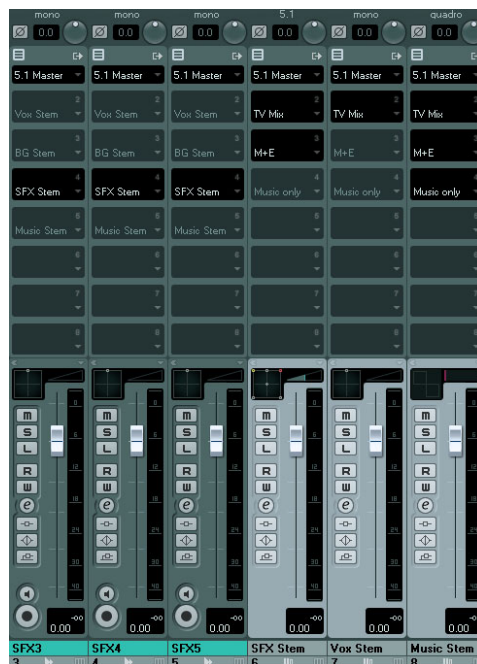
Direct Routing offers the following advantages:

- Routing destinations can be set for multiple channels at the same time.
- The switching of routing destinations can be automated.
- The extended Mixer panel offers eight easy-to-use destination slots for each channel.
- Multiple Direct Routing destinations can be assigned and activated at the same time.
- Upmixing or downmixing happens automatically, if necessary.

Direct Routing destinations in the Mixer

The Direct Routing panel is shown in the extended Mixer view by clicking the “Show Direct Routing” button on the common panel (see [“Configuring the extended channel strips”](#) on [page 155](#)). Here, you can make all necessary settings for setting up multiple routing destinations.

Additionally to the main output you can set up seven routing destinations that are positioned post-fader and post-panner in the signal path and share the configuration of the main output. If you want to set up outputs with a different channel width, upmixing or downmixing becomes necessary. For more information, see [“Automatic upmixing and downmixing”](#) on [page 173](#).



Audio tracks routed to group channels (on the left) and group channels routed to different output busses (on the right)

Setting up the routing panel

Once you have set up your project, created your output busses, and defined the groups (stems) that you want to work with, you can set up the Direct Routing panel. Including the main output, up to eight routing destinations can be assigned to each channel strip. It is recommended to choose the same set of destinations for all channels that belong together (for example, all audio tracks containing dialogue). By setting up multiple outputs, you can later switch the routing destination for the channels very quickly (see [“Automating destination switches”](#) on [page 172](#)), or activate multiple destinations (see [“Feeding signals to multiple destinations”](#) on [page 172](#)).

To set up the routing panel, proceed as follows:

1. In the Mixer, make sure that the extended Mixer view is visible.
2. On the common panel, click the “Show Direct Routing” button.
Eight routing destination slots appear above each channel strip.

3. Select all the channels for which you want to set up the same destinations (e.g. all audio tracks, or all groups).

- The Direct Routing settings can be applied to all selected channels at once. To do this, keep [Shift]-[Alt]/[Option] pressed when making a selection or activating a button.

4. Open the Output Routing pop-up menu for the first (topmost) destination slot and choose the main output for the selected channels.

The main output should have the widest channel configuration since it is used as a reference for all additional output destinations. For more information, see [“Automatic upmixing and downmixing”](#) on page 173.

5. Open the Output Routing pop-up menu for the next destination slot, and select another output. Do this for as many destination slots as you need (up to eight).

For example, you can route all your audio tracks to the corresponding groups (stems).

6. Repeat this procedure for channels of a different type. For example, after routing your audio tracks to groups, you can route the groups to output busses.

7. For each channel, you can now activate the appropriate routing destination by clicking on the corresponding slot.

Narrow vs. wide channel strips

The Mixer panel can be set to show “narrow” or “wide” channel strips (see [“Setting the width of channel strips”](#) on page 157). Switching to the narrow view can be useful after setting up the Direct Routing destinations so that more channel strips fit on the screen. However, not all controls for the routing destinations are available in this mode.

Automating destination switches

Especially in larger postproduction scenarios it is necessary to switch the output destinations for audio-related tracks and to automate these switches. This is especially useful for FX channel tracks carrying insert effects that you want to apply to different stems (e.g. reverb). Another scenario could be if a certain type of sound is sometimes part of the ambience stem and at other times needs to be fed to the SFX stem. By using the Direct Routing features, you can achieve the switches “on the fly” with a simple mouse click.

To automate the switching of routing destinations, proceed as follows:

1. Play back your project, taking note of the positions where routing changes are necessary.

2. Write-enable the corresponding track, and at the right moment, click on the routing destination that you want to switch to.

The new destination is now active, and the switch has been recorded as automation data.

3. Continue to record destination changes for your project.

⇒ To switch destinations for multiple channels simultaneously, select these channels and keep [Shift]-[Alt]/[Option] pressed when activating a different destination.

Feeding signals to multiple destinations

Generally, routing destinations are assigned exclusively. For each channel, only one output can be active at a time. However, Direct Routing offers a summing mode, allowing you to feed your signals to several outputs at the same time.

In film mixing projects it is likely that you need to create different mixes. For example, you might need a final 5.1 mix for cinema and a stereo mix for home screening, as well as an M&E mix (needed to create a dubbed version, for example, for the German audience). Recording these mixes one after the other will take considerable time. To get an impression of how these different mixes will sound in the end, Nuendo allows you to activate multiple outputs at the same time so that you can quickly create different mix versions for previewing. However, since no individual settings can be made for these mixes, this will not replace the final mixing process.

Feeding a signal to multiple outputs can also be used to apply an effect to several stems at the same time. For example, you may want to add reverb to the dialogue and Foley stems simultaneously to create a realistic sound experience.

Proceed as follows:

1. In the Mixer, set up your output busses as routing destinations (see [“Setting up the routing panel”](#) on page 171).

2. Select all the channels that you want to route to the same destinations.

⇒ In order to apply the following settings to all selected channels at once, keep [Shift]-[Alt]/[Option] pressed when making a selection or activating a button.

3. Activate the “Summing Mode On/Off” buttons for the selected channels.

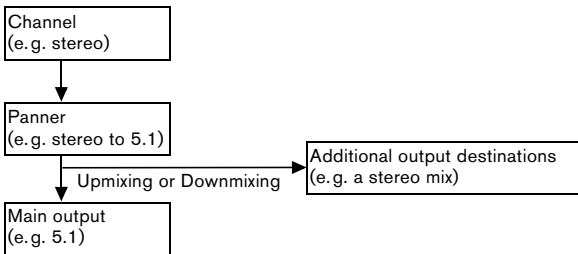


⇒ In the Key Commands dialog (Mixer category), you can also set up a key command for the summing mode (see the chapter “[Key commands](#)” on [page 580](#)).

4. Activate all the outputs that you want to route the selected channels to.

Automatic upmixing and downmixing

The output in the first (topmost) Direct Routing slot defines the channel width. Since the other destinations are positioned post-panner in the signal path (see graphic) they have the same channel width to start with. Therefore, if you set up outputs with a different channel configuration, the signal needs to be converted accordingly (by upmixing or downmixing). This is done automatically by Nuendo, no configuration is necessary.



When using multiple routing destinations, the following scenarios are possible:

- The Direct Routing destination has the same number of channels as the main output, but a different format: The levels of the speaker channels are adjusted accordingly. If both destinations have the same format, no upmixing or downmixing is required.

- The main output configuration is wider than the Direct Routing destination: A downmix is performed before sending the signal to that destination (e.g. from 5.1 to stereo).

⚠ It is recommended to always select the output with the widest channel configuration in the “Main” slot.

- The main output has less channels than the Direct Routing destination: An upmix is performed before the signal is sent to that destination (e.g. from stereo to 5.1).

It is not recommended to use such a setup (even though it is technically possible). Upmixing might lead to unexpected side effects. For example, if the main output is stereo and you have an additional 5.1 output, this second output gets an upmixed stereo signal feeding only the left and right channels.

Based on two common examples, the following tables illustrate how the levels are adjusted when performing an automatic downmix. The channel configuration as defined by the main output is shown from left to right, and the channel configuration of the downmix from top to bottom.

Automatic downmixing from 5.1 to stereo:

	L	R	C	Lfe	Ls	Rs
L	0.0		-3.01	-3.01	-6.02	
R		0.0	-3.01	-3.01		-6.02

Center and Lfe signals are split to L and R channels, Ls and Rs are sent to L and R (respectively), but reduced in volume.

Automatic downmixing from 7.1 to 5.1:

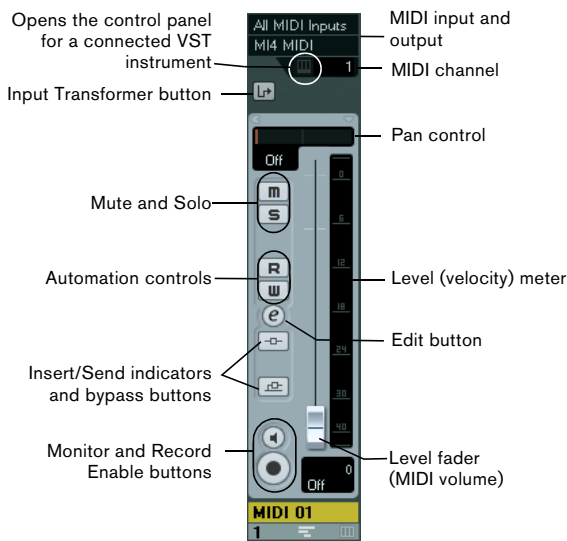
	L	R	C	Lfe	Ls	Rs	Lc	Rc
L	0.0						-3.01	
R		0.0						-3.01
C			0.0				-3.01	-3.01
Lfe				0.0				
Ls					0.0			
Rs						0.0		

Lc and Rc signals are split to L/R (respectively) and the center channel.

MIDI-specific procedures

This section describes basic procedures for MIDI channels in the Mixer.

MIDI channel strips



The MIDI channel strips allow you to control volume and pan in your MIDI instrument (provided that the instrument is set up to receive the corresponding MIDI messages). The settings here are also available in the Inspector for MIDI tracks.

Options for extended MIDI channel strips

When using the extended view (see [“Normal vs. extended channel strips”](#) on [page 154](#)), the upper panel can be set to show different views for each MIDI channel strip. You can select what to display in the extended panel individually for each channel or globally for all channels (see [“Configuring the extended channel strips”](#) on [page 155](#)). The following views are available:

- A blank panel (“Empty”).
- The Inserts section, with 4 insert effect slots for the channel.

MIDI inserts can also be found in the Inspector and the Channel Settings window for MIDI channels. How to use MIDI insert effects is described in the chapter [“MIDI realtime parameters and effects”](#) on [page 372](#).

- The Sends section, with 4 send effect slots for the channel.

The sends can also be found in the Inspector and the Channel Settings window for MIDI channels. How to use MIDI send effects is described in the chapter [“MIDI realtime parameters and effects”](#) on [page 372](#).

- The Meter section.

Select the Meter option to view large level (velocity) meters in the extended panel.

- The Overview section.

Select the Overview option if you want to know which insert effects and effect sends are activated for the channel.

You can click the indicators to turn the corresponding slot/send on or off.

- The User Panel section.

Select the User Panel option if you want to import MIDI device panels. This is described in the separate PDF document [“MIDI Devices”](#).

⇒ If you select the EQ, the Studio Sends, the Surround-Panners, or the Direct Routing option on the common panel, the view for MIDI channels does not change. These apply to audio-related channels only.

Panning MIDI channels

For MIDI channels, the pan control sends out MIDI pan messages. The result depends on how your MIDI instrument is set to respond to pan – check your documentation for details.

Using Channel Settings

For each MIDI channel strip in the Mixer (and MIDI track in the track list or the Inspector), there is an Edit (“e”) button.

Clicking this opens the MIDI Channel Settings window. By default, this window contains a duplicate of the Mixer channel strip, a section with four MIDI inserts and a section with four MIDI send effects.

You can customize the Channel Settings window by showing/hiding the different panels and/or by changing their order:

- To specify which panels are shown or hidden, right-click in the Channel Settings window and activate/deactivate the corresponding options on the Customize View submenu of the context menu.
- To change the order of the panels, select Setup on the Customize View pop-up menu and use the “Move up” and “Move Down” buttons in the dialog that opens.

Every MIDI channel has its own Channel Settings window.

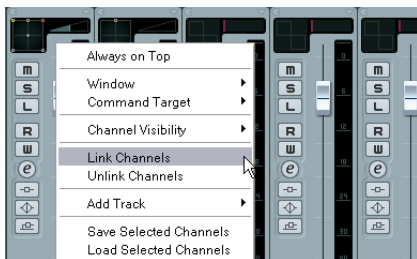


Utilities

Link/Unlink channels

This function is used to “link” selected channels in the Mixer so that any change applied to one channel will be mirrored by all channels in that group. Only channels of the same type (audio-related or MIDI) can be linked with each other. You can link as many channels as you like, and you can also create as many groups of linked channels as you like. To link channels in the Mixer, proceed as follows:

1. Press [Ctrl]/[Command] and click on all the channels you want to link.
[Shift]-clicking allows you to select a continuous range of channels.
2. On the Mixer context menu, select the Link Channels option.



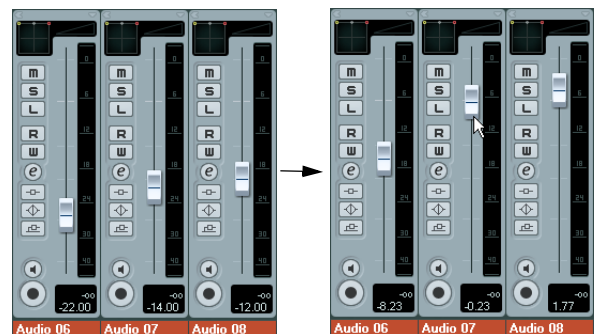
- To unlink channels, select one of the linked channels and select “Unlink Channels” from the Mixer context menu. The channels are unlinked. Note that you do not have to select all the channels that are linked, only one of them.

⇒ It is not possible to remove individual channels from the link.

What will be linked?

The following rules apply to linked channels:

- Only level, mute, solo, select, monitor and record enable will be linked between channels. Effect/EQ/pan/input and output routing settings are not linked.
- Any individual channel settings you have made before linking will remain until you alter the same setting for any of the linked channels.
For example, if you link three channels and one of them was muted at the time you applied the Link Channel function, this channel will remain muted after linking. However, if you mute another channel, all linked channels will be muted.
- Fader levels will be “ganged”.
The relative level offset between channels will be kept if you move a linked channel fader.

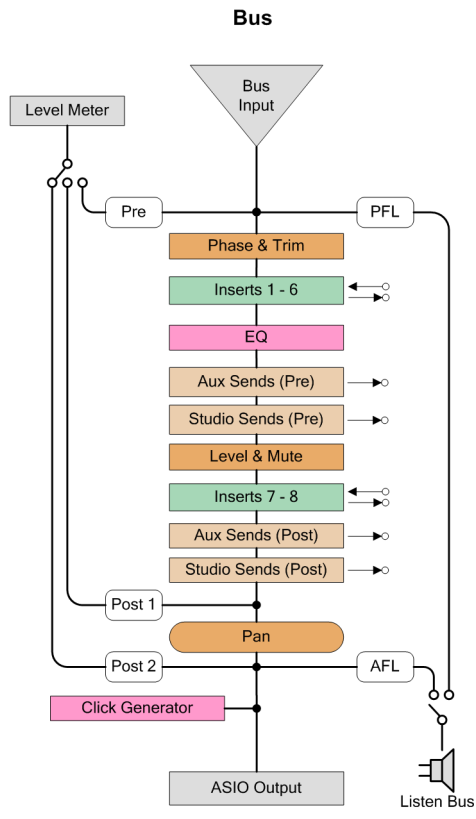
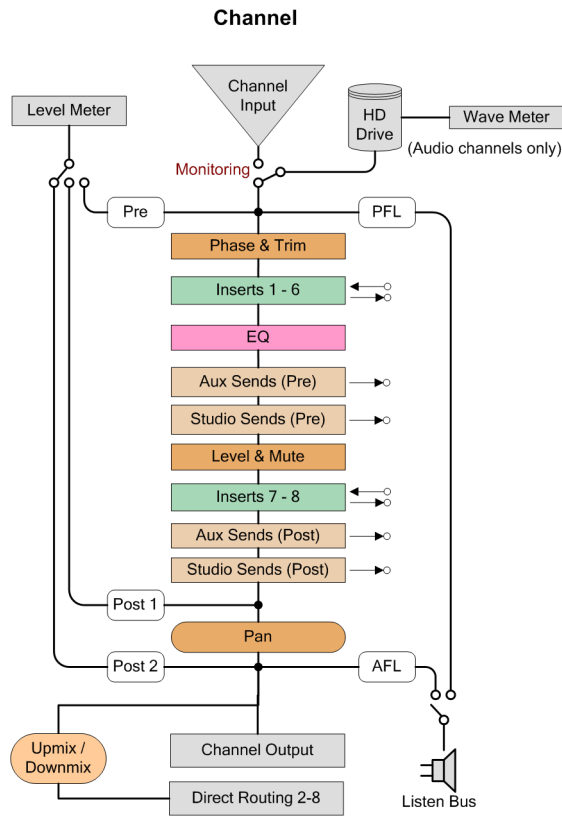


The three channels shown are linked. Moving one fader changes the levels for all three channels, but keeps the relative level mix.

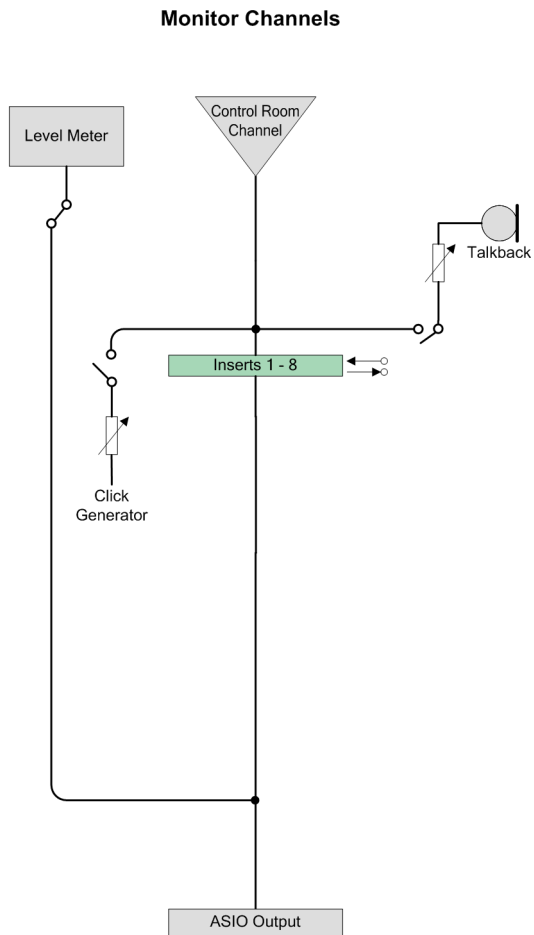
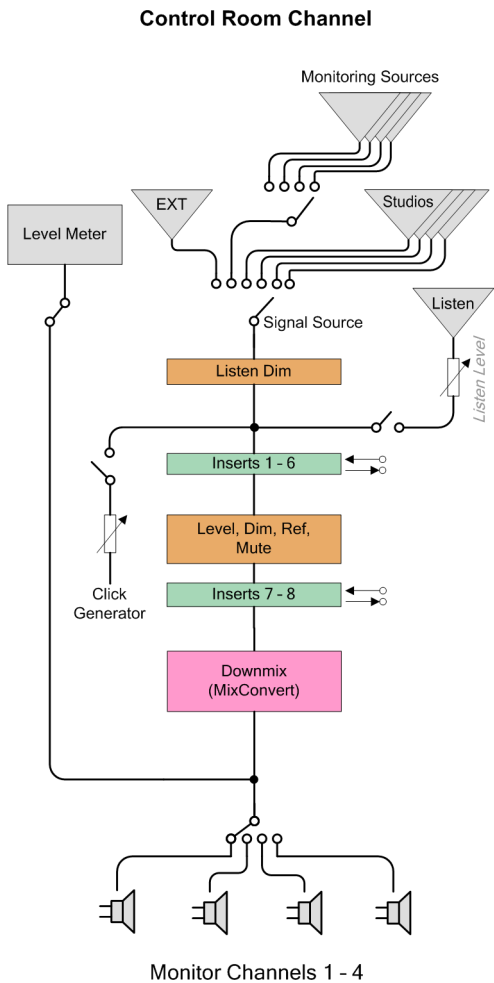
- By pressing [Alt]/[Option], you can make individual settings and changes for channels that are linked.
- ⇒ Linked channels have individual automation tracks. These are completely independent, and are not affected by the Link function.

VST Mixer Diagrams

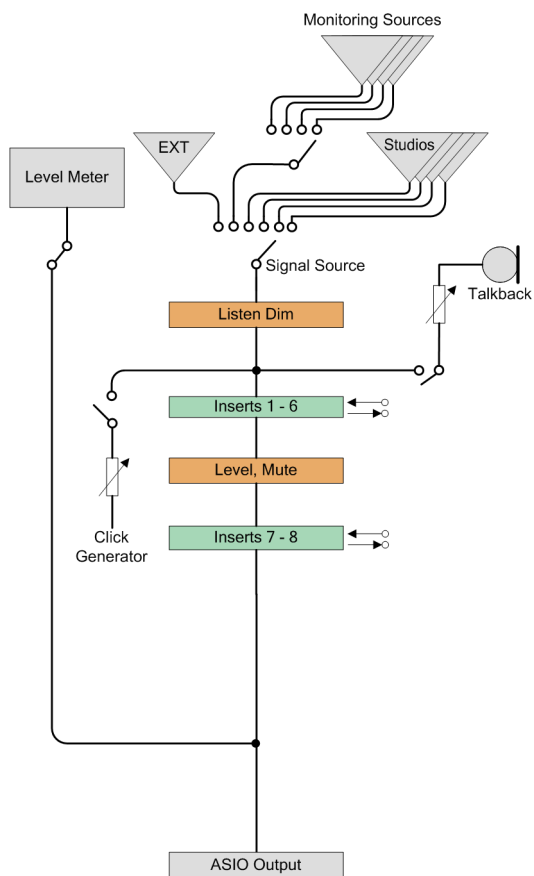
Channel Objects



Control Room Objects



Studio Channel



14

Control Room

Virtual Control Room – The concept

The concept behind the Control Room features in Nuendo is to divide the studio environment into the performing area (studio) and the engineer/producer area (control room) common to traditional studios. Previously, an analog console or some method of speaker control and monitor routing was necessary to provide this functionality to the DAW environment.

With its Control Room Mixer and Control Room Overview features, Nuendo provides all the functionality of the analog console's monitoring section, along with many more features, in a virtual, VST-based audio environment where flexibility and instant recall are expected.

Control Room features

The following features are available for the Control Room Mixer:

- Support for up to four sets of monitors with various speaker configurations from mono up to 7.1 or 8.0 cinema speaker systems.
- Configurable monitor sources that allow you to route different inputs, outputs, and groups to the Control Room.
- Dedicated Headphone output.
- Support for up to four discrete cue mix outputs called "Studios".
- Dedicated Talkback channel with flexible routing and automatic record defeat.
- Support for up to six external inputs with configurations up to 7.1 or 8.0 surround.
- Click track routing and level control to all Control Room outputs.
- Flexible Listen bus options with the Listen Dim setting that allows listen-enabled tracks to be heard in context with the whole mix.
- Listen bus enabling on both Control Room and Headphone outputs.
- User-definable downmix settings using the MixConvert plug-in for all speaker configurations.
- Individual speaker soloing for all speaker configurations.
- Multiple inserts on each Control Room channel for metering and surround decoding among other possibilities.
- Monitor Dim function with adjustable level.
- User-defined Calibrated Monitor level for postproduction mixing in a calibrated environment.
- Adjustable Input Gain and Input Phase on all external inputs and Speaker outputs.

- Full-sized meters on every Control Room channel.
- Support for up to four aux sends (Studio Sends) for creation of discrete cue mixes for performers. Each Studio output has its own cue mix.
- The ability to disable the Control Room Section when working with an external monitoring solution or console.

Control Room operations

In traditional analog studios, the control room section of the console contained the most used set of controls in the whole studio.

The need to constantly be able to switch monitoring sources, adjust the volume of monitors and route various cue mixes and other sources to headphone systems is the norm in most sessions. Meeting the needs of several performers in the studio plus a producer and the engineer becomes a constant task that requires flexibility and ease of operation. Communication between everyone must be flawlessly clear without intruding on the creativity of performers.

The Nuendo Control Room Mixer is designed to fill those needs with a simple yet highly flexible solution. The virtual mixing environment of VST is the ideal solution to the varied needs of a control room matrix. With a virtual mixer, a high degree of customization and precise settings are possible with the ability to completely recall these settings at any time.

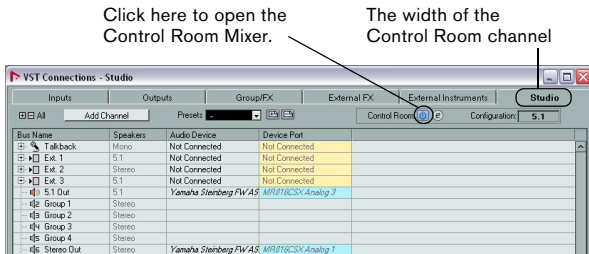
Configuring the Control Room

The Control Room features are configured in several locations within Nuendo.

- The hardware inputs and outputs for the Control Room channels are defined in the VST Connections window on the Studio tab. Here you can also enable and disable the Control Room.
- The Control Room Overview gives you a visual overview of the Control Room channels and signal flow. It is opened via the Devices menu.
- The Control Room Mixer allows operation of the Control Room features. It can be opened from the Project window toolbar (Media & Mixer Windows section), the Devices menu, or the Studio tab in the VST Connections window.
- Some general Control Room settings can be found in the Preferences dialog (VST–Control Room page).

VST Connections – Studio tab

The Studio tab of the VST Connections window is where you configure the inputs and outputs for the Control Room Mixer. You can also enable or disable the Control Room and open the Control Room Mixer. The channel width of the Control Room channel is shown in the Configuration field on the top right of the tab. For more information about the VST Connections window, see the chapter “VST Connections” on page 27.



The Studio tab of the VST Connections window showing several Control Room channels

⇒ When the Control Room is enabled, the Main Mix bus is automatically shown on the Studio tab. The reason is that the Main Mix is always available as a monitor source in the Control Room Mixer (see “Selecting a monitor source” on page 188). However, editing the Main Mix bus can only be done on the Outputs tab.

⇒ By default, one stereo Monitor channel is created after installing Nuendo.

About the Control Room channels

There are different types of channels that you can create, each defining either an input or output of the Control Room Mixer. As more channels are created, the Control Room Mixer expands to display controls for each channel.

Of all Control Room channels only Monitor channels can share hardware inputs or outputs with another bus or channel, as defined in the VST Connections window (see “Adding input and output busses” on page 30). As you create connections for each Monitor channel, those device ports that have already been used for other busses or channels are shown in red on the Device Port pop-up menu. If you select a port marked in red, the previous connection of this port is lost.

⇒ In order to avoid confusion due to suddenly missing port connections on other tabs, you may want to set all the outputs to “Not Assigned” while the Control Room is being set up.

Monitors

Each Monitor channel is a set of outputs that are connected to monitor speakers in the Control Room. Up to four Monitor channels can be created for the different sets of speakers in a studio. Monitor channels can be configured for a mono, stereo or up to 7.1 or 8.0 surround speaker configuration. A typical postproduction studio could have one set of 5.1 surround speakers, another stereo set of speakers, and even a single mono speaker for checking balances for mono broadcast.

The Control Room Mixer allows you to switch speakers easily. Each set of Monitors can have its own custom downmix settings, input gain and input phase adjustments.

Monitor sources

Postproduction setups usually require more than one mix bus (e.g. for dialogue, sound effects, and music). Every bus is recorded separately, but the re-recording mixer has to listen individually to the different busses as well as to the sum of all mix busses. For this purpose you can set up different monitor sources in the VST Connections window and then use the Control Room Mixer to dynamically select the mix source(s) that you want to listen to.

As a monitor source you can select any available input or output bus, or group channel.

⚠ Note that the channel width of the Control Room is determined by the Main Mix bus. If you choose a monitor source with a wider configuration, automatic downmixing occurs. It is strongly recommended to always select the bus with the widest channel configuration as the Main Mix bus.

Phones

The Phones channel is used by the engineer in the control room for checking cue mixes and as another option for listening to the mix or external inputs on a pair of headphones. Furthermore, the Phones channel can be used for previewing, see [“Control Room preferences”](#) on [page 190](#). It is not intended for cue mixes that performers use while recording.

⚠ The Phones channel is stereo only.

Studios

Studio channels are intended for sending cue mixes to performers in the studio during recording. They have talkback and click functions and can monitor the main mix, external inputs or a dedicated cue mix. Up to four Studios can be created allowing four discrete cue mixes for performers.

For example, if you have two available headphone amplifiers for performers to use, create two Studio channels, one for each headphone mix.

⚠ Studio channels can either be mono or stereo.

External inputs

External inputs are used for monitoring external devices such as CD players, multi-channel recorders or any other audio source. Up to six external inputs can be created with various configurations from mono up to 7.1 surround.

⇒ If you select external inputs as input source of an audio channel, you can record them. In this case, you will not need to assign the device ports to the input channel (see [“Routing”](#) on [page 168](#)).

Talkback

The Talkback is a mono input used for a communications system between the control room and performers in the studio. Only one mono Talkback channel is available.

The Talkback channel can be routed to each Studio channel with variable levels in order to optimize communication between the control room and performers.

⇒ Additionally, the Talkback is available as a possible input source for audio tracks. You can record from the Talkback just like any other input.

⚠ Inserts are available on the Talkback and all other Control Room channels. A compressor/limiter can be inserted on the Talkback channel to ensure that erratic levels do not bother performers and clear communication with everyone is possible.

Creating a Control Room channel

To create a new channel for the Control Room, proceed as follows:

1. Open the Studio tab of the VST Connections window and click the Add Channel button.

A pop-up menu lists all available channel types along with how many of each type are available. Available Monitor Sources are listed on the corresponding submenu.

⇒ Instead of clicking the Add Channel button you can also select a channel type on the context menu of the Studio tab.

2. Select the type of channel you wish to create.

For most channel types a dialog opens, allowing you to choose the configuration of the channel (stereo, 5.1, etc.).

The new channel is displayed in the VST Connections window. For each audio path except the monitoring sources (see below) an audio device must be selected. You can assign device ports to channels in the same fashion as assigning any VST connection.

⚠ Note that the port assignments for all Control Room channels except Monitor channels are exclusive, meaning that you cannot assign the same device port to any bus or channel and a Control Room channel at the same time.

Exclusive assignment of Monitor channels

Even though the port assignment to the Control Room channels is generally exclusive, it might be useful to create Monitor channels that share device ports with each other as well as inputs and outputs. This can be helpful if you use the same speakers as a stereo pair and also as the left and right channels of a surround speaker configuration.

Switching between monitors that share device ports will be seamless, providing any downmix of multi-channel audio to stereo if needed. Only one monitor set can be active at a time.

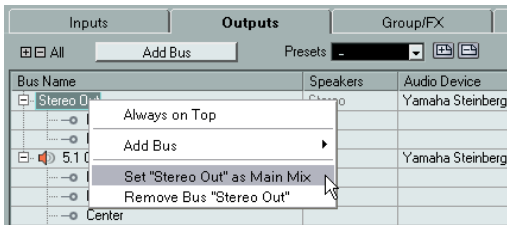
If your scenario does not require you to assign ports to several Monitor channels, it is recommended to activate the “Exclusive Device Ports for Monitor Channels” option in the Preferences dialog (VST–Control Room page). This way you can make sure that you do not accidentally assign ports to inputs/outputs and Monitor channels at the same time.

⇒ The state of the “Exclusive Device Ports for Monitor Channels” preference is saved together with the Control Room presets. Therefore, if you recall a preset, your current setting in the Preferences dialog might be overwritten.

Outputs – Main Mix

For the Control Room to function correctly, the Main Mix on the Outputs tab should have the widest bus configuration in your project. This is due to the fact that the configuration of the Main Mix defines the channel width of the Control Room (see also “[The Main Mix and the Control Room channel](#)” on [page 188](#)).

If you have more than one output bus defined, you can choose another bus as Main Mix by right-clicking on the name of the output and selecting “Set ‘Out’ as Main Mix”. The Main Mix is marked by a small speaker icon to the left of its name.

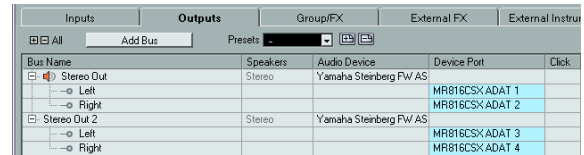


Selecting an output bus as Main Mix in the VST Connections window.

Outputs other than the Main Mix are not routed automatically through the Control Room Mixer. However, they can be added as additional monitor sources in the VST Connections window (see “[Selecting a monitor source](#)” on [page 188](#)).

Output click enabling

There may be a situation when you want the click to be routed always to a specific output bus, regardless of the actual Control Room settings, or indeed when the Control Room is disabled. In these cases, enable the click on specific outputs using the Click column on the Outputs tab in the VST Connections window.

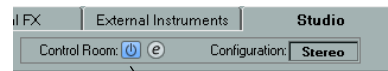


The Outputs tab showing the Main Mix and a second stereo output that is click enabled.

- ⚠ The click will only be heard in outputs that are assigned to device ports. Note that the click can also be routed to device ports using the Control Room features.
- ⚠ Be aware that some audio interfaces allow very flexible routing within the hardware itself. Certain routing configurations can cause overloads and possible damage to speaker equipment. Consult the hardware documentation for further information.

Disabling the Control Room

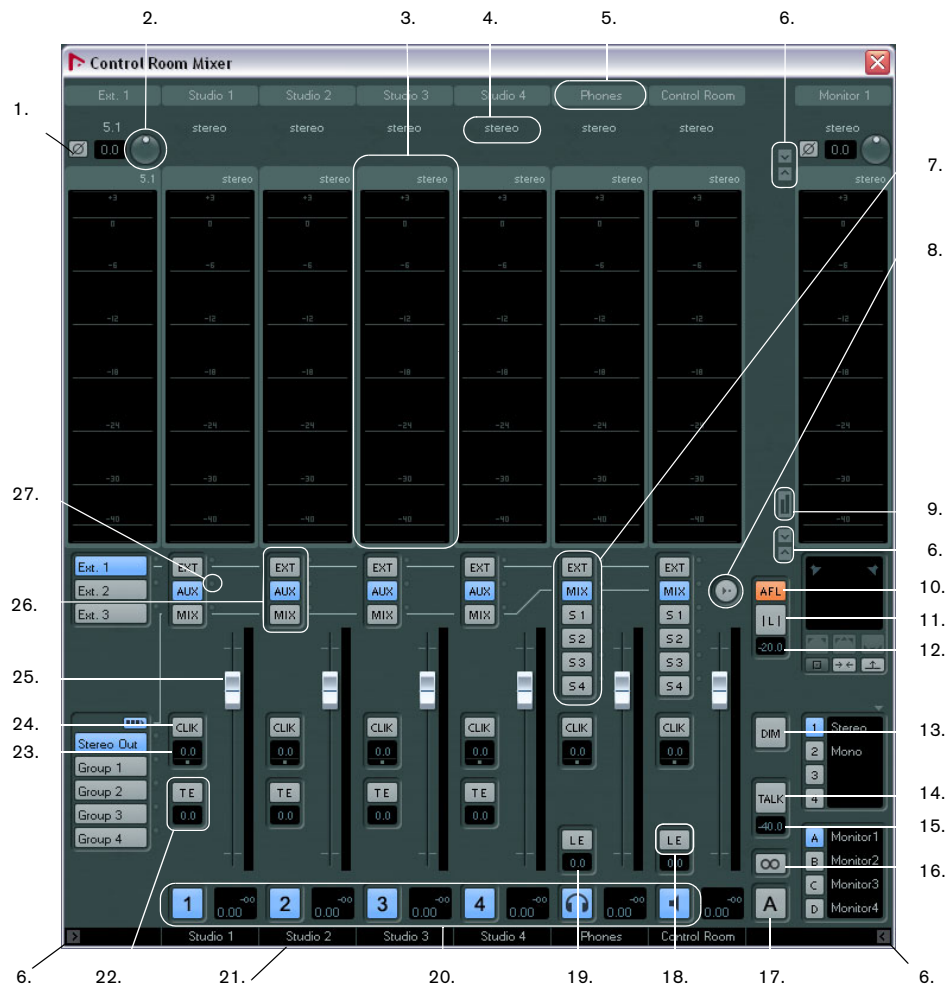
Once you have created all the channels for your studio configuration, the Control Room functions are available for use. If you need to use Nuendo without the Control Room functions, you can simply disable the Control Room using the On/Off button on the Studio tab of the VST Connections window. Any channels you have created are saved, and when you enable the Control Room again, that configuration is reloaded.



Click here to disable the Control Room.

You can also create presets for the Control Room configuration in the same manner as for inputs and outputs, see “[Presets](#)” on [page 31](#).

The Control Room Mixer



The Control Room Mixer is where you can access all the features of the Control Room. It is designed to display information and controls only for the channels you have defined in the VST Connections window. For example, if you have not defined any Studio channels, they will not appear in the Control Room Mixer. If you want to see all possible channels, use the Control Room Overview instead (see [“The Control Room Overview”](#) on [page 193](#)).

The Control Room Mixer has a variety of controls, some that are similar to the Project Mixer and some that are unique to Control Room operations. In the following each control is briefly described:

1. Input Phase

Each external input and Monitor speaker output has an Input Phase reversal switch. When lit, all audio paths within the channel have their phase reversed.

2. Input Gain

Each external input, Monitor speaker output and the Talkback input has an Input Gain control. When an external input or Monitor becomes active, the Gain settings are recalled.

3. Channel inserts

Each channel in the Control Room Mixer has inserts available. For detailed information about inserts in the Control Room Mixer, see [“Configuring the Control Room Mixer” on page 187](#).

4. Channel configuration

This displays the current configuration of audio paths in the channel, e.g. Stereo or 5.1.

5. Channel labels

This displays the name of the channel as defined in the VST Connections window.

6. Expansion controls

There are several arrow buttons that open and close additional panels of the Control Room Mixer. By default, the extended panels are hidden. For more information, see [“Configuring the Control Room Mixer” on page 187](#).

7. Control Room and Headphone input selectors

These buttons allow you to select input sources for the Control Room and Headphone channels. The choices are External Input, Monitor Mix, or any one of the four Studio channels.

8. Use Reference Level

When you click this button, the Control Room level is set to the reference level set in the Preferences dialog, e.g. a level for calibrated mixing environments such as film dubbing stages. Press [Alt]/[Option] and click this button to set the Reference Level setting in the Preferences dialog to the current Control Room level.

9. Show Meters/Inserts button

This allows you to switch between the display of meters and inserts for the extended Mixer view.

10. Listen Bus AFL/PFL

This button determines whether the signal of a listen-enabled channel is routed to the Control Room channel after applying the fader and pan settings (AFL) or before (PFL) (see [“Listen mode” on page 161](#)).

11. Listen Activate/Deactivate All Listen

When lit, this indicates that one or more channels in the Project Mixer are listen-enabled. Clicking this button deactivates Listen for all channels.

12. Listen DIM Level

This gain control adjusts the volume of the Main Mix (or monitor source) when channels have been put in Listen mode. This allows you to keep listen-enabled channels in context with the Main Mix. If the Listen DIM level is set to minus infinity, you will only hear the listen-enabled channels. Any other setting leaves the Main Mix at a lower level.

13. DIM Signal

This turns the Control Room level down by a preset amount (the default setting is -30dB). This allows a quick reduction in monitor volume without disturbing the current monitor level. Clicking on the DIM button again returns the monitor level to the previous setting.

The default value can be changed by adjusting the “Main Dim Volume” setting in the Preferences dialog (VST–Control Room page).

14. Activate Talkback

Click the TALK button to turn on the Talkback system, allowing communication between the control room and performers in the studio. There are two modes of operation: momentary mode used by clicking and holding the Talk button, and latch mode where clicking once turns the Talkback on until you click it again to turn it off.

15. Talkback DIM Level

When the Talkback is enabled, this control allows you to determine how much the output of all the channels in the Control Room Mixer is reduced. This prevents unwanted feedback. If the Talkback DIM level is set to 0dB, no change occurs in the Control Room channels.

16. Cycle Downmix Preset Selection

The Control Room allows four different speaker downmix settings for auditioning with various speaker configurations. Clicking this button cycles through the four downmix presets. Various icons appear to show which preset is active.

17. Cycle Monitor Selection

Pressing this button changes the Monitor selection to the next available set. As Monitors are changed, so are the downmix presets, Monitor inserts, Input Gain, and Input Phase controls associated with that Monitor set.

18. Listen Enable for Output

This activates the Listen bus function for either the Control Room or Headphone output. If this is not enabled, the Listen bus will not be routed to that channel.

19. Listen Level for Output

This level adjustment determines how loud Listen bus signals are when routed to the Control Room or Headphone output. Clicking on the number pops up a fader control for adjustment.

20. Activate channel buttons

These buttons turn each channel's output on or off. When lit, the channel is on.

21. Channel labels

These labels reflect the names entered in the VST Connections window.

22. Talkback Enable to Studio and talkback amount

In order for Talkback signals to be routed to a Studio, the Talkback Enable to Studio button must be lit. Clicking on it turns it on or off. When Talkback Enable is deactivated, the Talkback DIM setting has no effect on this output.

The value below the button controls the amount of Talkback signal fed to the output of each Studio.

23. Metronome Level and Pan

The Level and Pan controls determine how the Metronome will be heard in each channel. These controls are independent for each channel.

24. Activate Metronome Click

This determines whether click signals are sent to each channel. When lit, click signals will be heard in that output.

25. Channel Level control

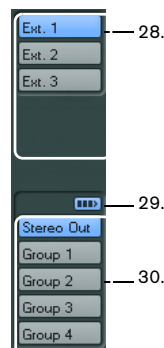
This is the main volume for each Control Room output. These faders do not affect recording input levels or the Main Mix level for exporting mix-downs.

26. Studio input selectors

For Studio channels, the input choices are External Input, Aux (from Studio Sends), or Monitor Mix.

27. Signal Presence Indicators

In the Preferences dialog, there is an option to display these Signal Presence Indicators as a substitute for the full size meters.



28. External input selectors

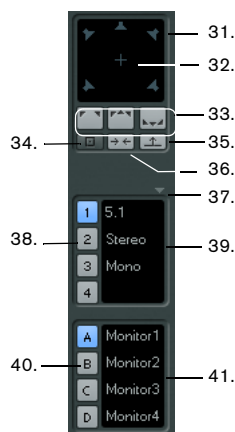
Up to six external inputs are available. These buttons determine which external input is currently being used. The names for the external inputs are displayed here as they were entered in the VST Connections window.

29. Multiple Monitor Sources button

When this button is activated, you can select multiple monitor sources to listen to the sum of several mix busses at the same time.

30. Monitor Source selectors

Using these buttons you can activate/deactivate the available monitor sources that were set up in the VST Connections window. For more information about selecting a monitor source, see ["Selecting a monitor source"](#) on [page 188](#).



The Monitor controls in the Control Room Mixer

31. Individual Speaker Solos

Each speaker icon is a solo button for that channel. [Shift]-clicking a speaker will solo all the speakers in that row (front or rear). [Ctrl]/[Command]-clicking on a speaker that is already soloed will mute that speaker and solo all other channels.

Use the speaker solos to test your multi-channel speaker system and ensure that the proper channels are routed to each speaker.

32. LFE Solo

The "+" icon solos the LFE channel.

33. Solo Left and Right/Front/Rear Channels

These buttons solo the left and right channels, the front channels, or the rear channels (from left to right).

34. Cancel Speaker Solo

This button defeats all speaker solos, resetting them to normal playback.

35. Listen to Rear Channels on Front Monitors

This button solos the rear channels and routes them to the front speakers.

36. Listen to Solo Channels on Center Monitor

When this button is enabled, all speakers that are soloed will be heard in the center channel if there is one in the configuration. If not (as with stereo) the soloed channel will be heard equally in both left and right speakers.

37. Open MixConvert Settings

Clicking on this tab opens the MixConvert plug-in used to downmix multi-channel signals for monitoring. With this plug-in you can modify the settings for each downmix preset. For more information about the MixConvert plug-in see the chapter [“Surround sound”](#) on [page 226](#) and the separate PDF document “Plug-In Reference”.

Note that you can also double-click in the center of the speaker solo area to open the MixConvert plug-in.

38. Downmix Preset Selection

With these buttons you can select the downmix preset for the current Monitor. Automatic configuration of the downmix settings follows a logical path. For example, if you have defined one set of 5.1 monitors and another set of stereo monitors, Nuendo will create a 5.1 to stereo downmix preset and another downmix to mono.

39. Downmix labels

This area displays the names of the four downmix presets. You can click on a name to change it. A “?” appears when there is no preset defined for that downmix.

40. Monitor selection

With these buttons you can select the current Monitor set. Each Monitor has its own settings including downmix preset, solo enables, inserts, input gain and input phase. These settings are automatically recalled when a Monitor is selected.

41. Monitor labels

This area displays up to four Monitors. The names are entered in the VST Connections window when you define a Monitor channel.

Configuring the Control Room Mixer

In order to display more controls in the Control Room Mixer, the small arrows in the lower left and right corners can be clicked to open or close the extended speaker controls on the right (“Show Right Strip”) and the External Input and Talkback controls on the left (“Show Left Strip”).

The arrow in the upper right corner of the Control Room Mixer (“Show Extended View”) extends the Mixer vertically to display meters and inserts. A second arrow appears above the inserts and meter display. Extending the Mixer using this arrow (“Show Routing View”) exposes the Input Gain and Input Phase controls, the channel configuration and the name of each channel. Each panel can be closed by clicking the corresponding down arrow.

The different Control Room Mixer panels are handled in the same way as the Project Mixer panels, see [“Configuring the Mixer”](#) on [page 154](#).

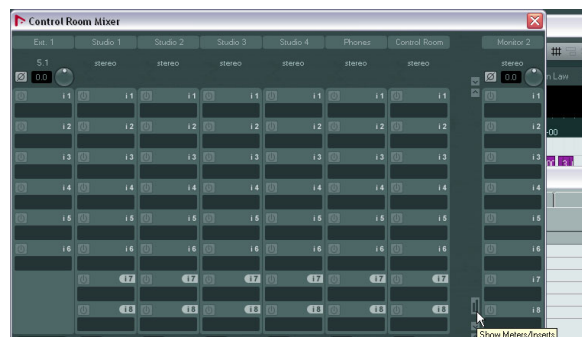
⚠ You can also use the Window submenu of the Control Room Mixer context menu to show/hide the different panels, just as in the Project Mixer.

Control Room inserts and meters

In the extended view of the Control Room Mixer the meters are visible. They function the same way as the ones in the Project Mixer.

When you click the Show Meters/Inserts button to the right of the meters display, the view changes to show inserts instead of meters. Alternatively, these can also be displayed by deactivating the Show Meters option on the Window submenu of the Control Room Mixer context menu.

Each Control Room channel has a set of inserts configured as six pre-fader and two post-fader inserts. External input channels only have the six pre-fader inserts and Monitor channels have eight inserts (post Control Room fader).



If you do not wish to see full sized meters but still want some indication of signal activity, activate the “Signal Presence Indicators” option in the Preferences dialog (VST–Control Room page). They will be displayed next to the input selection buttons and indicate signal presence for all inputs.



Control Room Mixer channels with active Signal Presence indicators

Inserts for external inputs

Each external input has its own set of six inserts. By clicking the button next to the name of an external input on the left of the Mixer window, the inserts associated with that channel are displayed in the extended view.

Inserts for the Talkback channel

The Talkback channel has a separate set of eight inserts. In order to view and adjust them, the Talkback must be enabled via the TALK button located in the bottom right section of the Control Room Mixer. Click once on the TALK button to activate the Talkback system. The inserts for external inputs are now replaced with the Talkback inserts. Once the Talkback is disabled, the view reverts to external input inserts.

⚠ You can easily identify the inserts for the Talkback since they have six pre-fader and two post-fader inserts while the external inputs only have six pre-fader inserts. If the Control Room Mixer is fully expanded, the name displayed at the very top of the Mixer reflects which channel is currently visible in the extended panel.

Monitor inserts

Each Monitor channel has a set of eight inserts, all of which are post Control Room fader. The Monitor inserts are most useful for surround decoding or brickwall limiting to protect sensitive monitor speakers.

The Main Mix and the Control Room channel

The channel configuration of the Main Mix determines the channel configuration of the Control Room channel. Switching between a project that has a stereo Main Mix to a project that has a 5.1 Main Mix will cause the Control Room channel in the Control Room Mixer to change from a stereo to a 5.1 configuration.

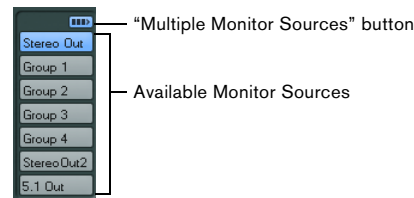
The Control Room configuration also determines the layout of the Speaker Solo panel. If the channel is stereo, the solo panel only contains a left and a right speaker.

Any external input that has more channels than the Main Mix will not be heard correctly when routed to the Control Room channel. Only the channels available will be heard.

⇒ If a 5.1 external input is routed to a stereo Control Room channel, only the left and right channels are heard even if a 5.1 Monitor is selected. Only two channels can be routed through a stereo Control Room channel. You can use an instance of MixConvert on the external input’s inserts to downmix the material to stereo in order to hear it.

Selecting a monitor source

In the section on the bottom left of the Control Room Mixer you can select which monitor source(s) are routed to the Control Room.



Initially, only the Main Mix appears in this section. If you want to add further sources (e.g. separate submixes or stems) you need to set up monitor sources in the VST Connections window, see “Monitor sources” on [page 181](#).

Depending on whether you want to listen to several submixes at the same time or to an individual submix alone, you can activate several monitor sources at the same time (summing mode) or switch between different monitor sources (exclusive mode).

Activating several monitor sources at the same time

By activating several monitor sources, you will hear the sum of the selected busses or group channels. For example, this is useful to listen to the final mix without having to route the individual submixes to the Main Mix first. There are two ways to achieve this:

- Activate the “Multiple Monitor Sources” button and successively click on the monitor sources that you want to include.
- Hold down [Shift] and click on the monitor sources that you want to include.

This modifier also works if the “Multiple Monitor Sources” button is deactivated.

Switching between individual monitor sources

If you want to listen to only one monitor source at the same time, you can switch between exclusive sources:

- Deactivate the “Multiple Monitor Sources” button and click on the monitor source that you want to listen to.
- Hold down [Alt]/[Option] and click on the monitor source that you want to listen to.

This modifier also works if the “Multiple Monitor Sources” button is activated.

⇒ To toggle between summing mode and exclusive mode or to switch to another monitor source, you can also define additional key commands in the Key Commands dialog (Control Room category). For more information about defining key commands, see the chapter “[Key commands](#)” on [page 580](#).

Suggested settings

With all the versatility that the Control Room provides there are also opportunities for confusion when first setting up the Control Room. The following list contains suggestions that can help to quickly set up the Control Room and get started for recording and mixing.

- If you do not have a master recording device and only use the Export Mixdown function to create final mix files, set your Main Mix output to “Not Assigned”. This eliminates many confusing errors and unpredictable behavior since outputs and Control Room Monitors can share hardware outputs. The Main Mix is automatically routed to the Control Room channel and will not be affected.
- Create one stereo Monitor to familiarize yourself with the Control Room level controls, DIM settings, the Listen bus, and other monitoring features. Once you have become acquainted with some of these functions, create additional Monitors for every set of speakers you intend to use.
- Use the inserts on Monitor channels for surround decoding and bass management plug-ins among other things.
- Use the inserts on the Control Room channel for metering and spectral analysis plug-ins. All solos including the Listen bus will come through the Control Room channel allowing analysis of individual sounds.
- A brickwall limiter in the last insert of the Control Room channel can prevent accidental overloads and damage to speaker systems.
- Use the inserts for the Talkback channel to control the dynamics of the talkback microphone. This will help protect performers' hearing and ensure that everyone can be heard over the talkback microphone.
- Use the Gain settings on the external inputs to level balance CD players and other sources to the Main Mix level for A/B comparisons.
- Use the Gain settings on each Monitor to level balance all your monitor systems. Switching between sets of speakers will result in the same playback volume.
- Use the calibrated Control Room level for film or DVD mixing. Set this level to the proper speaker volume as determined by the mixing standard you choose to follow.

Control Room preferences

There are several preferences for the Control Room Mixer. These are found in the Preferences dialog (VST–Control Room page).



Most of these preferences deal with what options are visible in the Control Room Mixer. This allows you to customize the layout of the Mixer and only have the controls visible that you use the most.

The other preferences have the following functionality:

- **Show Control Room Volume in Transport Panel**

This option makes the small fader at the right-hand side of the Transport panel control the Control Room level. When this option is not activated (or the Control Room is disabled), that fader controls the level of the Main Mix bus.

- **Disable Talkback during Recording**

This option deactivates the Talkback channel when the transport enters record mode. It is advisable to set the Talkback DIM level to 0dB when using this feature so as not to radically change the mix level when punching in and out of record mode.

- **Use Phones Channel as Preview Channel**

When activated, the Headphone output is used for Preview options such as import preview, scrubbing, offline process preview and certain Sample Editor operations. Note that when using the Headphones output for preview, the Control Room channel will no longer output preview audio.

- **Dim Studio during Talkback**

When this option is enabled, the cue mix heard in a Studio will be dimmed (by the amount set in the Talkback Dim Level field (below the TALK button) for as long as the Talkback channel is used. When disabled, the cue mix level remains the same during Talkback.

- **Exclusive Device Ports for Monitor Channels**

When activated, the port assignment for Monitor channels is exclusive (see [“Exclusive assignment of Monitor channels”](#) on [page 182](#)).

- **Reference Level**

This setting determines the Control Room level used when the Reference Level button is activated.

- **Main Dim Volume**

This is the amount of gain reduction applied to the Control Room channel when the DIM button is activated.

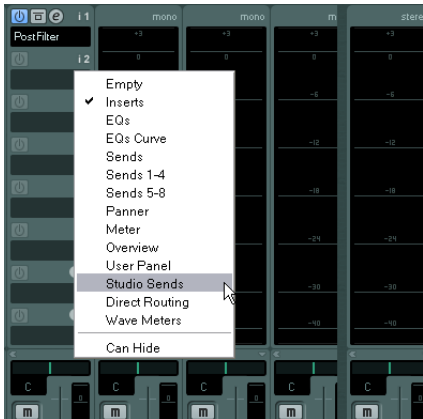
Studios and Studio Sends

Studio Sends are displayed in the Nuendo Project Mixer and the Inspector. Each Studio Send is intended for the creation of a discrete cue mix for performers to listen to during recording. Studio Sends are essentially stereo aux sends that are routed to Studio outputs in the Control Room Mixer. There are up to four Studios and Studio Sends available.

Configuring Studio Sends

Studio Sends only become available when a Studio channel has been created in the VST Connections window. Otherwise they remain grayed out. For every Studio defined in the VST Connections, each channel in the Project Mixer has an additional aux send with level, pan and pre/post-fader selection. This aux send is used to create a mix for a performer to listen to while recording.

- In the Project Mixer, the Studio Sends are accessed by choosing the Studio Sends option from the View options pop-up menu in each channel or by clicking the star icon (“Show Studio Sends”) on the common panel of the extended Project Mixer.



The Studio Sends view in the Project Mixer

- In the Inspector, a Studio Sends tab can be found. This displays all Studio Sends for the selected track. Please note that not all Inspector sections are available by default. To show/hide a section, right-click on an Inspector section and select/deselect the corresponding option on the context menu.

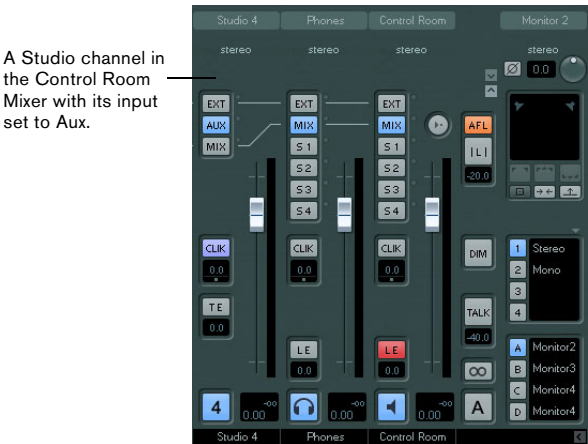


The Studio Sends tab in the Inspector

Each Studio can have a unique name in order to help identify what it is being used for. For example, the four Studios could be named as follows:

- Vocalist Mix
- Guitarist Mix
- Bassist Mix
- Drummer's Mix

The name of each Studio is displayed in the Control Room Mixer. To hear the Studio Sends mix in the Studio output, the input selector for each Studio must be set to “Aux”.



Setting up a Studio cue mix

The Studio Sends are very flexible. There are several ways to create a cue mix for each Studio in a very fast and efficient manner. Simple “more me” mixes and more complex discrete mixes are easily accommodated by the Studio Sends.

Using fader and pan settings from the Project Mixer

You can create a cue mix from the fader and pan levels already used in the Project Mixer and then alter them to meet the needs of an individual performer. You can do this with any single channel or group of channels at any time.

To copy fader and pan information from the main mix, proceed as follows:

1. In the Project Mixer, select all the channels that you wish to copy settings from.
The following operations affect only selected channels.
2. In the Control Room Mixer, right-click anywhere on a Studio channel strip to open the context menu that has the Studio's name as a submenu.

This submenu contains all the Studio Send functions for that Studio. If you open the context menu outside of a Studio channel strip, the submenu will be for All Studios.



The Control Room Mixer's context menu

3. Choose the "Use Current Mix Levels" option to copy the fader levels on the selected tracks to the Studio Sends.

This option sets all Studio Send levels for the selected tracks to the same level as the main channel fader. It also changes the Studio Send status to pre-fader so that changes in the main mix do not affect the Studio Sends.

4. Choose the "Use Current Pan Settings" option to copy pan information from the main mix to the Studio Sends on selected tracks.

Studio Sends are either mono or stereo. If the Send is mono, the pan setting will still be copied. However, the output of the Studio Send will be a sum of the left and right channels.

5. Choose the "Enable Studio Sends" option to activate the Sends on selected channels.

By default, Studio Sends are not enabled even when level and pan information is copied to them. You must enable them in order to hear the Studio cue mix.

By copying the level and pan information from the main mix to the Studio Sends, a rough balance can be created in a matter of moments. Next, you may alter the level and pan settings on any channel's Studio Sends to change the mix to meet the performer's needs. This may require increasing the volume of the performer herself. This is often referred to as a "more me" mix.

Adjusting the overall Studio Send level

Levels in the main mix are often optimized for the loudest signal level possible without clipping. However, when you are creating a "more me" mix, you may find that there is not enough headroom available in the Studio Send to turn up channels without clipping becoming a possibility.

Fortunately, the Studio Sends have an option to adjust multiple send levels at the same time, allowing you to keep the blend intact while lowering the overall volume to make room for "more me" signals.

Once you have created a Studio Send mix, proceed as follows to adjust their relative levels:

1. Select all the channels you wish to modify.
Only selected channels are affected by the context menu commands.

2. Right-click anywhere on the Studio channel strip in the Control Room Mixer to open the context menu for that Studio channel.

You may also use the context menu outside of the Studio channel strip to adjust all four Studio Sends on the selected channels at the same time.

3. Choose the "Change Studio Sends Level" option from the Studio submenu.

This will bring up a gain window with a checkbox that reads "Relative Mode". Make sure this is activated if you want to adjust already existing levels.

4. Either use the up and down arrow buttons or click on the numeric readout to open a pop-up fader and adjust the gain as necessary.

The level of all selected Studio Sends will be adjusted by the amount shown here. For example, if the amount reads -3dB, each Studio Send level is reduced by 3dB.

5. Click OK to change the level.

It is possible to view these changes as they occur if you have the Project Mixer open and the extended view set to show the Studio Sends.



⚠ If you deactivate the Relative Mode option, all Studio Sends are set to the same absolute level. While the dialog window is still open, you may activate the Relative Mode checkbox again and reload the previous relative levels. Only when you click OK, the level settings are made permanent. Clicking Cancel returns all send levels to their previous settings.

Using Studio Sends from outputs

Each output also has Studio Sends. Studio Sends from the Main Mix output can be used to route the main mix instantly to the Studio output.

Any level changes made to the main mix are reflected in the signal sent by the Studio Send. Setting the level lower than 0dB can leave headroom for “more me” signals in the Studio channel output.

Post-Fader Studio Sends

It is also possible to use the Studio Sends as post-fader aux sends. This is another way for the cue mix to follow changes made to the Main Mix. The Reset function is very helpful in this regard.

To reset the Studio Sends to the post-fader default level of -6dB, proceed as follows:

1. Select all the channels you wish to reset. Studio Send commands only work on selected channels.
2. On the Studio channel strip right-click to open the context menu. In the Studio submenu, select the “Reset Studio Sends” command.

If you open the context menu in other areas of the Control Room Mixer besides the Studio channel strips, the context menu commands will affect all Studios at the same time.

3. Selecting the “Reset Studio Sends” option changes the Send level of all selected channels to -6dB and sets the signal source to post-fader. The -6dB level is designed to allow for headroom for “more me” signals in the Studio outputs.

Once all Studio Sends have been set to -6dB, post-fader, any changes to the main mix will also change the Studio mix. For “more me” channels, simply turn up the level on that channel or even set the signal to pre-fader for absolute control.

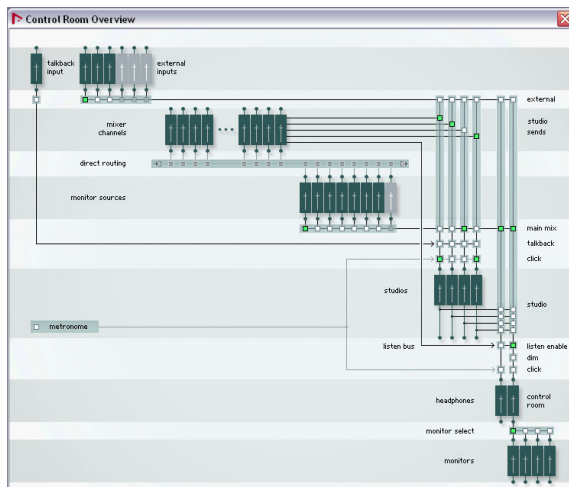
Studio Send cue mix summary

Using various combinations of the above techniques allows you to create complex discrete cue mixes for performers in very little time. Modifications to these mixes can occur in the Project Mixer or the Inspector, giving you the most accessibility for quick changes.

To familiarize yourself with how the Studio Sends work, open the extended Project Mixer and set the view to the Studio Sends. Follow the above examples and watch how the Studio Sends react to various commands. This should help you get a feel for how they function and increase the workflow productivity of recording sessions.

The Control Room Overview

You can access the Control Room Overview from the Devices menu. The Control Room Overview is designed to display the current configuration of the Control Room. The window shows all possible channels, with active channels highlighted once they have been created in the VST Connections window. Channels that are grayed out have not been defined in the VST Connections window.



The Control Room Overview allows you to see the signal flow through the Control Room Mixer. All the routing functions of the Control Room Mixer are duplicated in the Overview.

Open the Control Room Mixer and the Control Room Overview windows side by side. As you operate the controls in the Mixer you will see the various pale squares light up in the Overview, indicating changes in signal flow. You can also click the squares in the Overview and watch the controls in the Mixer reflect the changes in signal flow.

Direct Monitoring and latency

The Control Room and Studio Sends functions use the internal processing power of the host computer system for all routing and processing, which means they are subject to the computer's latency.

When recording with several performers at once, a system capable of running at very low ASIO buffer settings will be necessary to take full advantage of all the Studio Send features.

Studio Sends are not capable of controlling the Direct Monitoring features of various audio hardware interfaces. This means that unless the internal latency of the system is very low (128 samples or less), monitoring of record-enabled tracks through the Studio Sends will have some delay that can affect performers during recording.

In the situation where internal latency is too much for record monitoring, it is advisable to use the Studio Sends for monitoring of tracks that have already been recorded and use normal Direct Monitoring for tracks currently being recorded.

About this chapter

Nuendo comes with a number of effect plug-ins included. This chapter contains general details about how to assign, use and organize effect plug-ins. The effects and their parameters are described in the separate PDF document “Plug-in Reference”.

⚠ This chapter describes audio effects, i.e. effects that are used to process audio, group, VST instrument and ReWire channels.

Overview

There are three ways to use audio effects in Nuendo:

- As insert effects.

An insert effect is inserted into the signal chain of an audio channel, which means that the whole channel signal passes through the effect. This makes inserts suitable for effects for which you do not need to mix dry and wet sound, e.g. distortion, filters or other effects that change the tonal or dynamic characteristics of the sound. You can have up to eight different insert effects per channel (and the same is true for input and output busses – for recording with effects and “master effects”, respectively).

- As send effects.

Each audio channel has eight sends, each of which can be freely routed to an effect (or to a chain of effects). Send effects are practical for two reasons: you can control the balance between the dry (direct) and wet (processed) sound individually for each channel using the sends, and several different audio channels can use the same send effect. In Nuendo, send effects are handled by means of FX channel tracks.

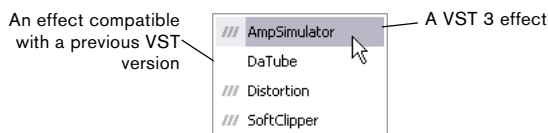
- By using offline processing.

You can apply effects directly to individual audio events – this is described in the chapter “Audio processing and functions” on page 263.

About VST 3

The new VST 3 plug-in standard offers many improvements over the previous VST 2 standard, yet retains full backwards compatibility, i.e. you will still be able to use your previous VST effects and presets.

In the program, effects compatible with previous VST versions will be easily recognized:



Nuendo is able to run plug-ins originally developed for different platforms: you can use a 32-bit plug-in under Windows Vista/Windows 7 64 bit, and you can use plug-ins developed for Mac PPC on Mac Intel systems.

As the use of 32-bit plug-ins on 64-bit computers affects the computer performance, these will be marked by an icon in the plug-in menus.

⇒ Please note that this functionality is provided to allow you to load older projects including their original plug-ins on current computers. However, the plug-ins will require higher CPU performance when compared to their native platform. Therefore, it is recommended to use 64 bit versions or Mac Intel (Universal Binary) versions of such plug-ins or instruments once available.

VST preset management

From a user perspective, the main difference between VST 2 and VST 3 is in the effect preset management. The FXP/FXB files used in VST 2 have been replaced by VST 3 Presets (extension “.vstpreset”). Using the preset management features, you can assign various attributes to your effect presets to help you quickly find the right patch. You can also preview effect presets before you load them. A large number of presets for effects are included with the program. If you have any previous VST plug-ins installed on your computer, you can still use them, and you can also convert their programs to VST 3 presets, see “Effect presets” on page 209.

Smart plug-in processing

Another feature of the VST3 standard is “smart” plug-in processing. Previously, any loaded plug-in was processing continuously, regardless of whether a signal was present or not. In VST3, processing by a plug-in can be disengaged if there is no signal present. This can greatly reduce the CPU load, thus allowing for more effects to be used.

This is achieved by activating the “Suspend VST3 plug-in processing when no audio signals are received” option in the Preferences dialog (VST–Plug-ins page).

When this is activated, VST 3 plug-ins will not consume CPU power on silent passages, i.e. when no audio data runs through them.

However, be aware that this can lead to a situation where you added more plug-ins on “transport stop” than the system can handle on playback. Therefore, you should always find the passage with the largest number of events playing simultaneously to make sure that your system offers the required performance.

⇒ Activating this option can increase your system performance a lot in certain projects, but it also makes it more unpredictable whether the project can play back fine on any timecode position of the project.

About side-chain inputs

Several VST3 effects feature side-chain inputs. This means that the operation of the effect can be controlled via external signals routed to the side-chain input. The effect processing is still applied to the main audio signal, see [“Using the side-chain input”](#) on [page 207](#).

About plug-in delay compensation

A plug-in effect may have some inherent delay or latency. This means that it takes a brief time for the plug-in to process the audio fed into it – as a result, the output audio will be slightly delayed. This especially applies to dynamics processors featuring “look-ahead” functionality.

Nuendo provides full plug-in delay compensation throughout the entire audio path. All plug-in delays are compensated for, maintaining the sync and timing of all audio channels.

Normally, you do not have to make any settings for this. However, VST3 dynamics plug-ins with look-ahead functionality have a “Live” button, allowing you to disengage the look-ahead to minimize latency, if they are to be used during realtime recording (see the separate PDF document “Plug-in Reference”).

You can also constrain the delay compensation, which is useful to avoid latency when recording audio or playing a VST instrument in real time, see [“Constrain Delay Compensation”](#) on [page 225](#).

About tempo sync

Plug-ins can receive timing and tempo information from the host application (in this case, Nuendo). Typically, this is used to synchronize certain plug-in parameters (such as modulation rates or delay times) to the project tempo.

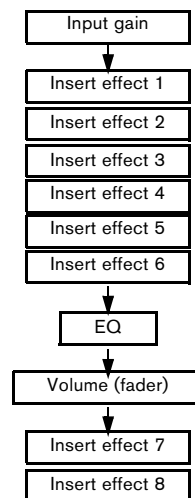
- This information is automatically provided to any VST plug-in (2.0 or later) that “requests it”. You do not have to make any special settings for this.
- You set up tempo sync by specifying a base note value. You can use straight, triplet or dotted note values (1/1 to 1/32).

Please refer to the separate PDF document “Plug-in Reference” for details about the included effects.

Insert effects

Background

As the name implies, insert effects are inserted into the audio signal path – this means that the audio channel data will be routed through the effect. You can add up to eight different insert effects independently for each audio-related channel (audio track, group channel track, FX channel track, VST instrument channel or ReWire channel) or bus. The signal passes through the effects in series from the top downwards, with the signal path shown below:



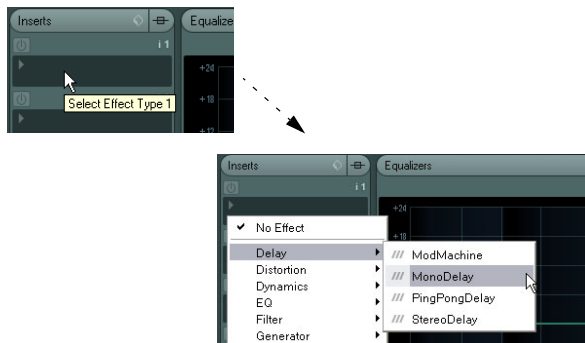
As you can see, the last two insert slots (for any channel) are post-EQ and post-fader. Post-fader slots are best suited for insert effects where you do not want the level to be changed after the effect, such as dithering (see [“Dithering”](#) on [page 201](#)) and maximizers – both typically used as insert effects for output busses.

⇒ Applying several effects on several channels may be too much for your CPU to handle! If you want to use the same effect with the same settings on several channels, it may be more efficient to set up a group channel and to apply your effect only once, as a single insert for this group. You can use the VST Performance window to keep an eye on the CPU load.

Routing an audio channel or bus through insert effects

Insert effect settings are available in the Mixer (in extended mode), the Channel Settings window and the Inspector. The examples below show the Channel Settings window, but the procedures are the same for all the inserts sections:

1. Bring up the Channel Settings window.
By default, the inserts are located to the far left.
2. Pull down the effect type pop-up menu for one of the insert slots, and select an effect.



The effect is loaded and automatically activated and its control panel opens. You can open or close the control panel for an effect by clicking the “e” button for the insert slot.

- If the effect has a dry/wet Mix parameter, you can use this to adjust the balance between the dry signal and the effect signal.

See [“Editing effects”](#) on [page 208](#) for details about editing effects.

- To remove an effect, pull down the effect type pop-up menu and select “No Effect”.

To reduce the CPU load, do this for all effects that you do not intend to use.

- You can add up to 8 insert effects per channel this way.
- You can reorder the effects by clicking in the area above the name field and dragging the effect onto another slot.
- You can copy an effect into another effect slot (for the same channel or between channels) by holding down [Ctrl]/[Command] and dragging it onto another effect slot.
- You can apply or remove an effect to or from all the selected channels at once by holding down [Shift]-[Alt]/[Option] and selecting the desired effect from any of the effect slots.

Deactivating vs. bypassing

If you want to listen to the track without having it processed by a particular effect, but do not want to remove this effect completely from the insert slot, you can either deactivate or bypass it.

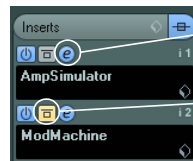
Deactivating means to terminate all processing, whereas bypassing means to play back only the unprocessed original signal – a bypassed effect is still processing in the background. Bypassing allows for crackle-free comparison of the original (“dry”) and the processed (“wet”) signal.

- To deactivate an effect, click the blue button on the left above the insert slot.

If you hold down [Shift]-[Alt]/[Option] when clicking the button, you activate or deactivate this effect slot for all selected channels.

- To bypass an effect, click its Bypass button (the middle button above the insert slot).

When an effect is bypassed, this button is yellow.



This effect is activated, and its control panel is open.

This insert effect is bypassed.

- To bypass all inserts for a track, click the global bypass button.

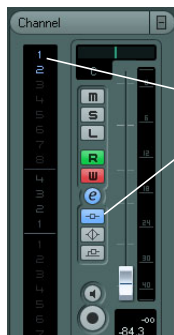
This button can be found at the top of the Inserts section in the Inspector or the Channel Settings window. It lights up in yellow to indicate that the inserts of this track are bypassed. In the track list and the channel strip in the Mixer, the Inserts State button will also light up in yellow.



Insert effects in the channel overview

If the “Channel” section is selected in the Inspector or the “Channel Overview” view mode is selected in the extended Mixer, you will get an overview of which insert effects, EQ modules and effect sends are activated for the channel.

You can activate or deactivate individual insert effect slots by clicking the corresponding number (in the top part of the overview).



The blue color of inserts 1 and 2 and the blue Inserts State button in the channel strip indicate that this track has active inserts.

The channel overview in the Inspector

Using effects in multi-channel configurations

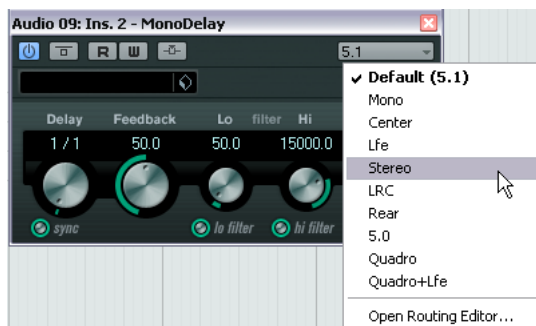
Whether an effect plug-in supports mono, stereo, or multi-channel processing depends on the capabilities of the corresponding plug-in. Regardless of this, all VST2 and VST3 plug-ins can be inserted on tracks with a multi-channel configuration. Surround-capable plug-ins are applied to all speaker channels (or a subset of these), while mono or stereo effects can only process one or two channels.

For example, if you insert a plug-in on a 5.1 track, Nuendo tries to apply a 5.1 configuration to this plug-in. If the plug-in is surround capable, this is accepted. However, if you insert a stereo insert effect, the first speaker channels of the track (L and R) are routed through the effect's available channels, and the other channels of the track are left unprocessed.

Setting up the channel configuration for the plug-in

Even though many plug-ins can be applied to several or all speaker channels in a surround configuration, this may not always be what you want. For example, you might want to apply a compression plug-in only to the Center channel in a 5.1 mix or apply reverb to everything except the LFE channel.

Nuendo offers you all the flexibility you need. From a pop-up menu in the plug-in panel you can choose a setup with less channels, and you can also modify the effect routing manually in the Routing Editor.



On the Effect Routing pop-up menu you can change the channel configuration of the plug-in.

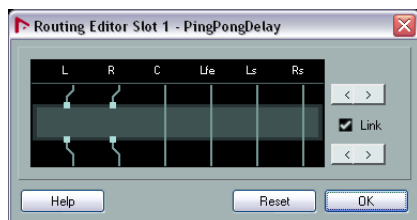
The first entry (default) is always identical with the channel configuration of the track. Below this you will find all possible channel subsets of the default configuration that are supported by Nuendo.

⇒ Not all plug-ins support all the channel configurations offered by Nuendo. If you select a configuration that is not supported by a plug-in, it will automatically chooses a different configuration.

Using the Routing Editor

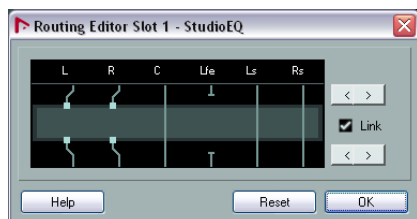
If the Effect Routing pop-up menu does not contain the configuration that you need, you can use the Routing Editor. It allows you to freely set up the routing for the individual channels. For example, if you want to apply an effect only to the right speaker, you can choose the Mono configuration from the pop-up menu and use the Routing Editor to move the connection from the left speaker (L) to the right (R).

- To open the Routing Editor, select “Open Routing Editor...” on the Effect Routing pop-up menu for the plug-in in question.



The columns in the diagram represent the channels in the current configuration, with signals passing from top to bottom. The gray field in the middle represents the actual effect plug-in.

- The squares above the effect represent inputs to the effect plug-in.
- The squares below the effect represent outputs from the effect plug-in.
- A line that passes through the effect (with no square input/output indicators) represent a bypass connection – the audio on that speaker channel passes the effect without being processed.
- A “broken” line indicates a broken connection – the audio on that speaker channel will not be sent to the output at all.



Here, the effect will process the L and R channels. The Ls, Rs, and C channels are not processed, while the Lfe connection is broken.

Operations

You can change the input/output assignment of the channels by moving connections to the left or right. To do this, use the arrow buttons to the right.

- The upper arrow buttons move the input connections, and the lower arrow buttons move the output connections. If the Link checkbox is activated, the input and output connections are always moved together. This is the mode to use when you simply want to process other channels than the default.
- If you move inputs or outputs independently, you create a “cross-connection”.



The audio on the Ls-Rs channels is processed in the plug-in and output on the L-R channels. Since the L-R channels are bypassed, this means the final L-R output will contain both the original L-R signals and the processed Ls-Rs signals.

- If a channel is bypassed (a straight line is shown through the plug-in), you can click on the line to break the connection.

Click again to replace the broken connection with a bypass.

- Clicking Reset takes you back to the original setup.

⇒ Changes you make in this window are audible immediately.

Insert Routing in the Channel Settings window

You can also open the Routing Editor via the Channel Settings window of the audio track on which the plug-in is inserted. To do so, make sure that the Insert Routing section is shown (via the Customize View submenu of the window's context menu). You can then double-click on the signal diagram to open the Routing Editor.

Adding insert effects to busses

All input and output busses have eight insert slots, just like regular audio channels. The procedures for adding insert effects are the same.

- Adding insert effects to an input bus allows you to record with effects.

The effects will become a permanent part of the recorded audio file (see the chapter ["Recording"](#) on [page 90](#)).

- Insert effects added to an output bus will affect all audio routed to that bus, like a "master insert effect".

Typically you would add compressors, limiters, EQ or other plug-ins to tailor the dynamics and sound of the final mix. Dithering is a special case, as described below.

Input and output busses only appear as tracks in the track list after their automation Write buttons have been activated at least once. Only then will you be able to make Inserts settings for the corresponding busses in the Inspector section. However, you can always make Inserts settings in the Channel Settings window and the extended Mixer panel.

Dithering

Dithering is a method for controlling the noise produced by quantization errors in digital recordings. The theory behind this is that during low level passages, only a few bits are used to represent the signal, which leads to quantization errors and hence distortion.

For example, when "truncating bits", as a result of moving from 24 to 16 bit resolution, quantization errors are added to an otherwise immaculate recording. By adding a special kind of noise at an extremely low level, the effect of these errors is minimized. The added noise could be perceived as a very low-level hiss under exacting listening conditions. However, this is hardly noticeable and much preferred to the distortion that otherwise occurs.

When should I use dithering?

- Consider dithering when you mix down to a lower resolution, either in realtime (during playback) or with the Export Audio Mixdown function.

A typical example is when you mix down a project to a 16-bit stereo audio file for audio CD burning.

What is a "lower resolution" then? Well, Nuendo uses 32-bit float resolution internally, which means that all integer resolutions (16 bit, 24 bit, etc.) are lower. The negative effects of truncation (no dithering) are most noticeable when mixing down to 8 bit, 16 bit and 20 bit format; whether to dither when mixing down to 24 bits is a matter of taste.

Applying dithering

1. Open the VST Output Channel Settings window by clicking the "e" button for the Output channel in the Mixer. You can also display the Inserts section in the extended Mixer pane.

2. Open the Inserts pop-up menu for slot 7 or 8.

The two last Insert effect slots (for all channels) are post-fader, which is crucial for a dithering plug-in. The reason is that any master gain change applied after dithering would bring the signal back to the internal 32 bit float domain, rendering the dithering settings useless.

3. Select the included UV22HR dithering plug-in from the pop-up menu.

The included dithering plug-ins and their parameters are described in the separate PDF document "Plug-in Reference". If you have installed another dithering plug-in that you prefer, you can of course select this instead.

4. Make sure that the plug-in is set to dither to the correct resolution.

This would be the resolution of your audio hardware (on playback) or the desired resolution for the mixdown file you want to create (as set in the Export Audio Mixdown dialog, see the chapter ["Export Audio Mixdown"](#) on [page 473](#)).

5. Use the other parameters in the control panel to set up the dithering to your liking.

Using group channels for insert effects

Like all other channels, group channels can have up to eight insert effects. This is useful if you have several audio tracks that you want to process through the same effect (e.g. different vocal tracks that you want to be processed by the same compressor).

Another special use for group channels and effects is the following:

If you have a mono audio track and want to process this through a stereo insert effect (e.g. a stereo chorus or an auto panner device), you cannot just insert the effect as usual. This is because the audio track is in mono – the output of the insert effect will be in mono as well, and the stereo information from the effect will be lost.

One solution is to route a send from the mono track to a stereo FX channel track, set the send to pre-fader mode and lower the fader completely for the mono audio track. However, this makes mixing the track cumbersome, since you cannot use the fader.

Here is another solution:

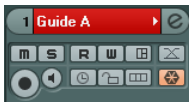
1. Create a group channel track in stereo and route it to the desired output bus.
2. Add the desired effect to the group channel as an insert effect.
3. Route the mono audio track to the group channel.

Now the signal from the mono audio track is sent directly to the group, where it passes through the insert effect, in stereo.

Freezing (rendering) insert effects for a track

Effect plug-ins can sometimes require a lot of processor power. If you are using a large number of insert effects for a track, you may reach a point where the computer cannot play back the track properly (the CPU overload indicator in the VST Performance window lights up, you get crackling sounds, etc.).

To remedy this, you can freeze the track, by clicking the Freeze button in the Inspector.



- The Freeze Channel Options dialog opens, allowing you to set a “Tail” time in seconds. This adds time at the end of the rendered file to allow reverb and delay tails to fully fade out.

- The program now renders the output of the track, including all pre-fader insert effects, to an audio file. This file is placed in the “Freeze” folder within the Project folder (Windows). On the Mac, the Freeze folder is stored under “User/Documents”.

- The frozen audio track is locked for editing in the Project window.

The frozen insert effects cannot be edited or removed and you cannot add new insert effects for the track (except post-fader effects).

- On playback, the rendered audio file is played back. You can still adjust the level and panning in the Mixer, make EQ settings and adjust the effect sends. In the Mixer, the channel strip for a frozen track is indicated by a “snowflake” symbol on the volume fader handle.

After freezing the Inserts for a track, you hear the track play back as before but the insert effects do not have to be calculated in real time, easing the load on the computer processor. Typically, you would freeze a track when it is finished and you do not need to edit it anymore.

- You can only freeze audio tracks this way, not group channel tracks or FX channel tracks.
- The last two insert effects will not be frozen. This is because these are post-fader insert slots.
- You can also freeze VST instruments and their insert effects – see the chapter [“VST instruments and instrument tracks”](#) on [page 215](#).

Unfreezing

If you need to edit the events on a frozen track or make settings for the insert effects, you can unfreeze the track:

1. Click the Freeze button in the Inspector for the track. You will be asked whether you really want to unfreeze the channel and if you wish to keep or delete the freeze files.

2. Click “Unfreeze” or “Keep Freeze files”.

This reactivates the frozen insert effects. Clicking “Keep Freeze Files” will unfreeze the channel but not delete the freeze files. After editing, you can freeze the track again.

Send effects

Background

As their name implies, send effects are outside of an audio channel's signal path, i.e. the audio data to be processed must be sent to the effect (as opposed to insert effects, which are inserted into the channel's signal path).

To this end, Nuendo provides FX channel tracks. When you have created such a track, it is added to the track list and can be selected as a routing target in the Send slots of audio channels.

- When selecting an FX channel track in one of the send slots of an audio channel, the audio is sent to the FX channel and through any insert effects set up for it.

Each audio channel has eight sends, which can be routed to different FX channels, and thus different FX channel insert effect configurations. You control the amount of signal sent to the FX channel by adjusting the effect send level.

- If you have added several effects to the FX channel, the signal passes through the effects in series, from the top (the first slot) downward.

This allows for "custom" send effect configurations – e.g. a chorus followed by a reverb followed by an EQ and so on.

- The FX channel track has its own channel strip in the Mixer, the effect return channel.

Here you can adjust the effect return level and balance, add EQ and route the effect return to any output bus.

- Each FX channel track can have any number of automation tracks, for automating various effect parameters. See the chapter ["Automation"](#) on [page 239](#) for more information.

Setting up send effects

Adding an FX channel track

1. Pull down the Project menu, open the "Add Track" submenu and select "FX Channel". A dialog opens.



2. Select a channel configuration for the FX channel track.

Normally, stereo is a good choice since most effect plug-ins have stereo outputs.

3. Select an effect for the FX channel track.

This is not strictly necessary at this point – you can also leave the plug-in pop-up menu set to "No Effect" and add effects to the FX channel later.

4. Click the Add Track button.

An FX channel track is added to the track list, and the selected effect, if any, is loaded into the first insert effect slot for the FX channel (in that case, the lit Inserts tab for the FX channel track in the Inspector indicates that an effect has been assigned and automatically activated).

- All FX channel tracks you create will appear in a dedicated "folder" track in the track list.

This makes it easy to manage and keep track of all your FX channel tracks, and also allows you to save screen space by folding in the FX Channel folder.



FX channel tracks are automatically named "FX 1", "FX 2" etc., but you can rename them if you wish. Just double-click the name of an FX channel track in either the track list or the Inspector and type in a new name.

Adding and setting up effects

As mentioned above, you can add a single insert effect when you create the FX channel track. To add and set up effects after the FX channel track is created, you can either use the Inspector for the track (click the Inserts tab) or the VST FX Channel Settings window:

1. Click the Edit ("e") button for the FX channel track (in the track list, Mixer or Inspector).

The VST FX Channel Settings window appears, similar to a regular Channel Settings window.



On the left in the window you can find the Inserts section with eight effect slots.

2. Make sure that the FX channel is routed to the correct output bus.

This is done with the Output Routing pop-up menu at the top of the fader section (also available in the Mixer and Inspector).

3. To add an insert effect in an empty slot (or to replace the current effect in a slot), click in the slot and select an effect from the pop-up menu.

This works just like when selecting insert effects for a regular audio channel.

4. When you add an effect, its control panel will automatically appear. When you set up send effects, you normally set the wet/dry Mix control to all “wet”.

This is because you control the balance between the wet and the dry signal with the effect sends. For more information, see [“Editing effects”](#) on [page 208](#).

- You can add up to eight effects for an FX channel.

The signal will pass through all the effects in series. It is not possible to adjust the send and return levels separately for the effects – this is done for the FX channel as a whole. If you want several separate send effects (where you can control the send and return levels independently), add more FX channel tracks instead – one for each effect.

- You can reorder the effects by clicking in the area above the name field and dragging the effect onto another slot.

- You can copy an effect into another effect slot (for the same channel or between channels) by holding down [Ctrl]/[Command] and dragging it onto another effect slot.

- To remove an insert effect from a slot, click in the slot and select “No Effect” from the pop-up menu.

To reduce the CPU load, do this for all effects that you do not intend to use.

- You can bypass individual effects (or all effects) by clicking the corresponding Bypass button(s) for the FX channel track.

See [“Routing an audio channel or bus through insert effects”](#) on [page 198](#).

- You can also adjust level, pan and EQ for the effect return in the FX Channel Settings window.

This can also be done in the Mixer or in the Inspector.

⇒ Remember that the more effect units you use, the higher the CPU load.

Making settings for the sends

The next step is to set up a send for an audio channel and route it to the FX channel. This can be done in the Mixer (in the extended panel), in the Channel Settings window or in the Inspector for the audio track. The example below shows the Channel Settings window, but the procedure is similar for all the sections:

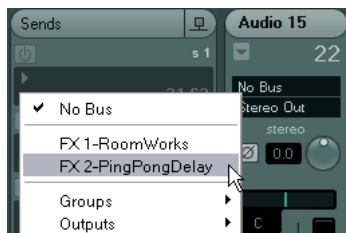
1. Click the “e” button for an audio channel to bring up its Channel Settings window.

By default, the send section is located to the left of the channel strip. Each of the eight sends has the following controls:

- An On/Off button for activating/deactivating the effect
- A send level slider
- A pre/post-fader switch
- An “e” (edit) button

Note that the last three items are not shown until the send is activated and an effect has been loaded.

2. Pull down the Routing pop-up menu for a send by clicking in the empty slot, and select the desired routing destination.



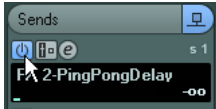
- If the first item on this menu (“No Bus”) is selected, the send is not routed anywhere.
- Items called “FX 1”, “FX 2” etc. correspond to existing FX tracks. If you renamed an FX track (see [“Adding an FX channel track”](#) on [page 203](#)), that name will appear on this menu instead of the default.
- The menu also allows for routing a send directly to output buses, separate output bus channels or Group channels.
- You can apply or remove a send to or from all the selected channels at once by holding down [Shift]-[Alt]/[Option] and selecting the desired effect from any of the effect slots.

3. Select an FX channel track from the pop-up menu.

Now the send is routed to the FX channel.

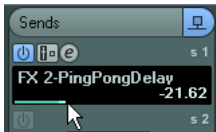
4. Activate the On/Off button for the effect send.

If you hold down [Shift]-[Alt]/[Option] when clicking the button, you activate or deactivate this effect slot for all selected channels.



5. Click and drag the send level slider to a moderate value.

The send level determines how much of the signal from the audio channel is routed to the FX channel via the send.



Setting the Send level.

- In the Fader section of the Channel Settings window, select the FX channel from the pop-up menu and adjust its effect return level.

By adjusting the return level, you control the amount of the signal sent from the FX channel to the output bus.



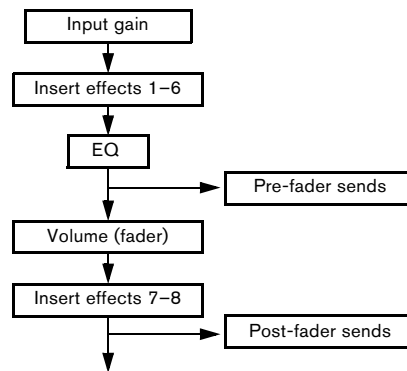
Setting the effect return level.

6. If you want the signal to be sent to the FX channel before the audio channel's volume fader in the Mixer, click on the Pre-Fader button for the send so that it lights up.



A send set to pre-fader mode.

Normally you want the effect send to be proportional to the channel volume (post-fader send). The picture below shows where the sends are “tapped” from the signal in pre and post-fader mode:



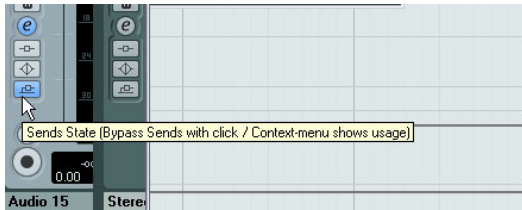
⇒ Use the channel's Mute button to determine whether a send in pre-fader mode is affected. This is done with the “Mute Pre-Send when Mute” option in the Preferences dialog (VST page).

- When one or several sends are activated for a channel, the Send Effects buttons light up in blue.

⇒ The FX channels themselves have sends, too.

Bypassing the sends

- In the Mixer, you can click on the lit (blue) Sends State button for a channel to bypass (disable) all its sends. When the sends are bypassed, the button is yellow. Click the button again to enable the sends.



- In the Inspector and the Channel Settings window, click the button to the left of the Sends button (so that it lights up yellow) to bypass the sends.
- You can also bypass individual sends in the channel overview. See [“Insert effects in the channel overview”](#) on [page 199](#).

- You can also bypass the send effects by clicking the “Bypass Inserts” button for the FX channel. This bypasses the actual effects which may be used by several different channels. Bypassing a send affects that send and that channel only. If you bypass the insert effects, the original sound will be passed through. This may lead to unwanted side effects (higher volume). To deactivate all effects, use the mute button in the FX channel.

Setting pan for the sends

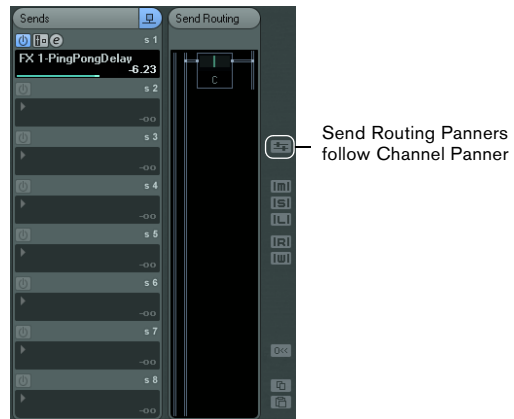
There are several possibilities to set up pan for the sends:

- To position the send signal at center pan in the stereo FX channel (or anywhere you like), route a send from a mono channel to a stereo FX channel track.
- To use the pan control as a crossfader, determining the balance between the stereo sides when the stereo send signal is mixed to mono, route a send from a stereo channel to a mono FX channel track.
- To use the surround panner to position the send signal in the surround image, route a send from a mono or stereo channel to an FX channel track in surround format.
- To set the panning with the Mixconvert plug-in, route a send from a surround channel to an FX channel in a format with less channels.

You set up send panning in the following way:

1. Open the Channel Settings window for the audio channel.
2. Right-click somewhere in the Channel Settings window (not the EQ display), to open the context menu and open the Customize View submenu.
3. From the submenu, select “Send Routing” and “Control Strip”.

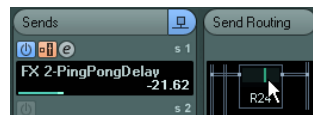
In the Send Routing section of the Channel Settings window, each send is shown as a small routing diagram showing a pre/post selector to the right and a pan fader (where applicable). In the Control Strip section, you can activate the “Send Routing Panners follow Channel Panner” option. The send panners will then follow the pan for the channel, making the stereo imaging as clear and true as possible. This behavior can also be set as default for all channels. The corresponding setting is available in the Preferences dialog (VST page).



The Sends, Send Routing, and Control Strip sections in the Channel Settings window

4. Click and drag the pan control for the desired send(s) in the display.

You can reset the pan control to the center position by [Ctrl]/[Command]-clicking on the pan control.



- If the FX channel is configured in a surround format, the pan control will be a miniature surround panner, similar to the one found in the Mixer.

You can click and drag the “ball” in the miniature panner display to position the send in the surround field, or double-click in the display to bring up the surround panner. See the chapter “[Surround sound](#)” on [page 226](#) for details.

⇒ If both the send (the audio channel) and the FX channel are in mono, the pan control is not available.

Using the side-chain input

Many VST 3.0 effects feature a side-chain input. Side-chaining allows you, for example, to lower the music volume when someone is speaking (“ducking”) or to use compression (e.g. on a bass sound) when the drums are hit, thereby “harmonizing” the intensity of the two instruments. Another possibility is to use the side-chain signal as a source for modulation.

The effect types which feature side-chain functionality are Delay, Dynamics, Modulation, and Filter.

⚠ For detailed descriptions of the plug-ins that feature side-chaining, see the separate PDF document “[Plug-in Reference](#)”.

⇒ Certain combinations of tracks and side-chain inputs may lead to feedback loops and added latency. If this is the case, the side-chain options will not be available.

Creating a Ducking delay

The delay repeats can be silenced by side-chain signals exceeding a certain threshold.

You can use this feature to create a so-called “ducking delay” for your vocals. Let’s say you want to add a delay effect that is audible only when no signal is present on the vocal track. For this, you need to set up a delay effect which is deactivated every time the vocals start again.

Proceed as follows:

1. Select the vocal track.
2. On the Project menu, select “Duplicate Tracks”.
Now you can use the vocal events on the second track to silence the delay effect.

3. Open the Inserts tab for the first Vocal track in the Inspector and select “PingPongDelay” from the Effects pop-up menu.

The control panel for the effect opens.

4. On the control panel for the effect, make the desired effect settings and activate the Side-Chain button.

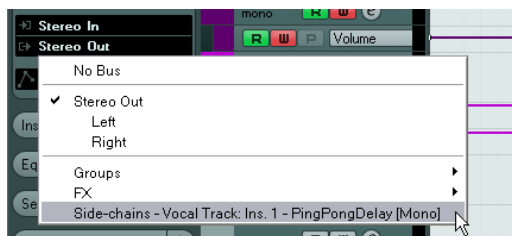
Try out the effect settings to find out which settings will work best with your project. For detailed descriptions of the parameters, see the separate PDF document “[Plug-in Reference](#)”.



5. In the track list, select the second vocal track.

6. Pull down the Output Routing pop-up menu and on the Side-Chain submenu, select the PingPongDelay effect you set up for the vocal track.

This way, the signals from the second (duplicate) track are routed to the effect (and do not end up in the mix).



Now every time the signals on the vocal track exceed the threshold, the delay will be deactivated. Since the threshold for the delay effect is fixed, you may have to adjust the volume of track 2, in this example, to ensure that vocal parts of low or middle volume will also silence the delay effect.

Triggering a compressor using side-chain signals

Compression, expansion or gating can be triggered by side-chain signals exceeding a specified threshold.

You may run into a situation where you want to lower the volume of one instrument every time another instrument is played. For example, you may want to lower the volume of the bass guitar during the bass drum hits. This can be achieved by applying compression to the bass guitar signal every time the drum signals are present on the respective track.

Proceed as follows:

1. Select the bass guitar track.
2. Open the Inserts tab in the Inspector, click in an insert slot to open the effect selection pop-up menu and, on the Dynamics submenu, select “Compressor”.
The effect is loaded into the effect slot and the effect control panel opens.
3. Make the desired effect settings (you will most likely have to adjust them later to get the right compression level) and activate the Side-Chain button.
4. Select the bass drum track.
5. Open the Sends Inspector section, click in a send slot and from the Side-Chain submenu, select the Compressor effect you created for the bass guitar track. Adjust the Send level.

This way, the bass drum signal triggers the compressor on the bass guitar track.

When you now play back the project, the bass guitar will be compressed whenever the signals on the bass drum track exceed the threshold.

Side-chain and Modulation

Side-chain signals bypass the built-in LFO modulation and instead apply modulation according to the envelope of the side-chain signal. Since each channel will be analyzed and modulated separately, this allows for creating astonishing spatial stereo or surround modulation effects. Feel free to experiment with the functions to see what they have to offer!

About drag & drop

When you drag effects from one insert slot to another (on the same channel or between different channels), the following applies:

- When you move an effect within a channel (e.g. from slot 4 to slot 6), the side-chain connections will be kept.
- When you drag and drop an effect between two channels, the side-chain connections will not be kept.
- When copying an effect into another effect slot (for the same or a different channel), the side-chain connections will not be copied, i.e. they will be lost.

Using external effects

Although this program comes with a top selection of VST effect plug-ins, and although there is a huge range of additional plug-ins available on the market, you may still have some hardware effect units that you want to use – valve compressors, reverb units, vintage tape echo machines, etc. By setting up external FX busses you can make your outboard equipment part of the Nuendo virtual studio!

An external FX bus is a combination of outputs (sends) and inputs (returns) on your audio hardware, along with a few additional settings. All external FX busses you have created will appear on the effect pop-up menus and can be selected like the internal effect plug-ins. The difference is that if you select an external effect as an insert effect for an audio track, the audio will be sent to the corresponding audio output, processed in your hardware effect (provided that you have connected it properly) and returned via the specified audio input.

⇒ Creating and handling of external effects is described in detail in the chapter “[VST Connections](#)” on [page 27](#).

Editing effects

All inserts and sends have an Edit (“e”) button. Clicking this opens the control panel for the effect, in which you can make parameter settings.

The contents, design and layout of the control panel depends on the selected effect. However, all effect control panels have an On/Off button, a Bypass button, Read/Write automation buttons (for automating effect parameter changes, see the chapter “[Automation](#)” on [page 239](#)),

a preset pop-up menu and a Preset Management pop-up menu for saving and loading effect presets. Some plug-ins also feature a side-chain button, see [“Using the side-chain input”](#) on [page 207](#).



The Rotary effect control panel

- Please note that all effects can be edited using a simplified control panel (horizontal sliders only, no graphics). This panel is opened by pressing [Ctrl]/[Command]-[Alt]/[Option]-[Shift] and clicking on the Edit button for the effect send or slot.

Effect control panels may have any combination of knobs, sliders, buttons and graphic curves.

⇒ The included effects and their parameters are described in detail in the separate PDF document “Plug-in Reference”.

- If you edit the parameters for an effect, these settings are saved automatically with the project.
- You can also save the current settings as a preset, see below.
- Effects parameters can be automated – see the chapter [“Automation”](#) on [page 239](#).

Effect presets

Effect preset management in Nuendo is very versatile. In the MediaBay – or with certain limits in the Save Preset dialog – you can assign attributes to presets which allow you to organize and browse them according to various criteria. Nuendo comes with a huge array of categorized track and VST presets that you can use straight out of the box. You can also preview effect presets before loading them which considerably speeds up the process of finding the right effect preset.

Effect presets can be divided into the following main categories:

- VST presets for a plug-in
These are stored parameter settings for a specific effect.
- Inserts presets that contain insert effect combinations
These can contain the whole insert effects rack, complete with settings for each effect, see [“Saving insert effect combinations”](#) on [page 211](#).

Selecting effect presets

Most VST effect plug-ins come with a number of useful presets for instant selection.

To select an effect preset in the Presets browser, proceed as follows:

1. Load an effect, either as a channel insert or into an FX channel.
The control panel for the effect is displayed.
2. Click in the preset field at the top of the control panel.
This opens the Presets browser.



- You can also open the Presets browser from the Inspector (Inserts tab) or the Channel Settings window.
3. In the Results section, select a preset from the list.
 4. Activate playback to audition the selected preset.
Simply step through the presets until you find the right sound. It may be helpful to set up cycle playback of a section to make comparisons between different preset settings easier.

5. When you have found the preset that you want, double-click on it (or click outside the Presets browser). The preset is applied.

- To return to the preset that was selected when you opened the Presets browser, click the “Revert to Last Setting” button.
- You can also open the Presets browser by clicking the button to the right of the preset field and selecting “Load Preset” from the pop-up menu.

⇒ The preset handling for VST 2 plug-ins is slightly different, see [“About earlier VST effect presets”](#) on [page 211](#).

The Browser sections

The Presets browser contains the following sections:

- The “Results” section lists the available presets for the selected effect.
- The Filters section shows the available preset attributes for the selected effect.

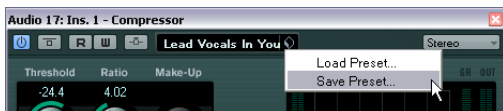
This section is similar to the Filters section in the MediaBay, see [“The Filters section”](#) on [page 335](#). To show the Filters section, click the “Set Up Window Layout” button and activate the Filters option.

- The Location Tree section allows you to specify the folder that is searched for preset files. To show the Location Tree section, click the “Set Up Window Layout” button and activate the Location Tree option. Note that this is only available if the Filters section is also active.

Saving effect presets

You can save your edited effect settings as presets for further use (e.g. in other projects):

1. Open the Preset Management pop-up menu.



2. Select “Save Preset...” from the pop-up menu. The Save Preset dialog opens.



3. In the New Preset section, enter a name for the new preset.
 - If you want to save attributes for the preset, click the button below the “New Preset” section at the bottom left. The Attribute Inspector section opens, allowing you to define attributes for the preset. For further information about attributes, see [“The Attribute Inspector”](#) on [page 347](#).
4. Click OK to store the preset and exit the dialog.

User-defined presets are saved in the following location:

- Windows XP: \Documents and Settings\\Application data\VST3 presets\- Windows Vista\Windows 7: \Users\\App-Data\Roaming\VST3 presets\- Mac: /Users/<user name>/Library/Audio/Presets/<company>/<plug-in name>

⇒ You cannot change the default folders, but you can add further subfolders inside the individual effect preset folders (by clicking the New Folder button).

About earlier VST effect presets

As stated previously, you can use any VST 2.x plug-ins in Nuendo. For a description of how to add VST plug-ins, see [“Installing and managing effect plug-ins”](#) on [page 212](#).

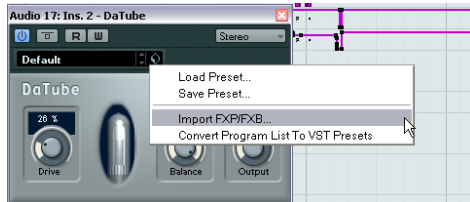
When you add a VST 2 plug-in, any previously stored presets for it will be in the old FX program/bank format (.fxp/.fxb). You can import such files, but the preset handling will be slightly different. You will not be able to use the new features like the Attribute Inspector until you have converted the old “.fxp/.fxb” presets to VST 3 presets. If you save new presets for the included VST 2 plug-ins, these will automatically be saved in the new “.vstpreset” format.

⚠ All VST 2 presets can be converted to VST 3 presets.

Importing and converting FXB/FXP files

To import FXB/FXP files, proceed as follows:

1. Load any VST 2 effect you may have installed, and open the Preset Management pop-up menu.



2. Select “Import FXP/FXB...” from the pop-up menu. This menu item is only available for VST 2 plug-ins.

3. In the file dialog that opens, locate the FXP file and click Open.

If you load a bank (.fxb), it will replace the current set of all effect programs. If you load a single program, it will replace the currently selected effect program only. Note that such files exist only if you created your own .fxp/.fxb presets with a previous version of Nuendo (or any other VST 2 application).

4. After importing, you can convert the current program list to VST presets by selecting “Convert Program List to VST Presets” from the Preset Management pop-up menu. After converting, the presets will be available in the Presets browser, and you can use the Attribute Inspector to add attributes and audition the presets. The converted presets will be stored in the VST3 Preset folder.

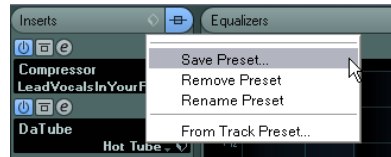
Saving insert effect combinations

You can save the complete insert effect rack for a channel together with all parameter settings as an inserts preset. Inserts presets can be applied to audio, instruments, FX channel, or group tracks.

Proceed as follows:

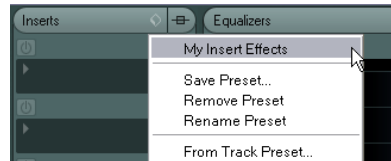
1. Select the desired track in the track list and open the Inserts Inspector section.
2. Load a combination of insert effects and adjust the parameters (or select effect presets) for each effect.
3. At the top of the Inserts tab, click the VST Sound button to open the Preset Management pop-up menu for the inserts and select “Save Preset...”.

This can also be done from the Channel Settings window using the VST Sound button at the top of the Inserts section.



4. In the dialog that opens, type in a name for the preset.
5. Select the track (audio/group/instrument/FX channel) you wish to apply the new preset to, and open the Preset Management pop-up menu.

As you can see, the new preset is available at the top of the pop-up menu.



6. Select the preset you created from the pop-up menu. The effects are loaded into the Insert slots of the new track, and the control panels for all effects are opened.

- Note that when loading insert combination presets, any plug-ins that were previously loaded for the track will be removed, regardless of whether these slots are used in the preset.

In other words, saving an inserts preset means saving the states of all insert slots.

- You can use the Preset Management pop-up menu to save your settings as preset, or to rename or remove the current preset.

Extracting insert effect settings from track presets

You can extract the effects used in a track preset and load them into your inserts “rack”:

- On the Preset Management pop-up menu, select “From Track Preset...” to open a dialog where all track presets are shown.
- Select an item in the list to load the effects used in the track preset.

Track presets are described in the chapter [“Working with track presets”](#) on [page 356](#).

Installing and managing effect plug-ins

Nuendo supports two plug-in formats; the VST 2 format (with the file name extensions “.dll” on the PC and “.VST” on the Mac) and the VST 3 format (extension “.vst3” on both platforms). The formats are handled differently when it comes to installation and organizing.

Installing additional VST plug-ins

Installing VST 3 plug-ins under Mac OS X

To install a VST 3.x plug-in under Mac OS X, quit Nuendo and drag the plug-in file into one of the following folders:

- /Library/Audio/Plug-Ins/VST3/
This is only possible if you are the system administrator. Plug-ins installed in this folder will be available to all users, for all programs that support them.
- /Users/<user name>/Library/Audio/Plug-Ins/VST3/
“<user name>” is the name you use to log on to the computer (the easiest way to open this folder is to go to your “Home” folder and use the path /Library/Audio/Plug-Ins/VST3/ from there). Plug-ins installed in this folder are only available to you.

When you launch Nuendo again, the new effects will appear on the effect pop-up menus. In the VST 3 protocol, the effect category, subfolder structure, etc. are built-in and cannot be changed. Therefore you will find the effect(s) in the assigned category folder(s) on the Effect pop-up menu.

Installing VST 2.x plug-ins under Mac OS X

To install a VST 2.x plug-in under Mac OS X, quit Nuendo and drag the plug-in file to one of the following folders:

- /Library/Audio/Plug-Ins/VST/
This is only possible if you are the system administrator. Plug-ins installed in this folder will be available to all users, for all programs that support them.
- <user name>/Library/Audio/Plug-Ins/VST/
“<user name>” is the name you use to log on to the computer (the easiest way to open this folder is to go to your “Home” folder and use the path /Library/Audio/Plug-Ins/VST/ from there). Plug-ins installed in this folder are only available to you.

When you launch Nuendo again, the new effects will appear on the effect pop-up menus.

⇒ If an effect plug-in comes with its own installation application, you should use this. As a general rule, always read the documentation or readme files before installing new plug-ins.

Installing VST 3 plug-ins under Windows

Under Windows, VST 3 plug-ins are installed by dragging the files (with the extension “.vst3”) into the VST3 folder in the Nuendo application folder. When you launch Nuendo again, the new effects will appear on the Effect pop-up menus. In the VST 3 protocol, the effect category, subfolder structure, etc. are built-in and cannot be changed. Therefore you will find the new effect(s) in the assigned category folder(s) on the effect pop-up menu.

Installing VST 2 plug-ins under Windows

Under Windows, VST 2.x plug-ins are installed by dragging the files (with the extension “.dll”) into the Vstplugins folder in the Nuendo application folder, or into the Shared VST Plug-in folder – see below. When you launch Nuendo again, the new effects will appear on the effect pop-up menus.

⇒ If an effect plug-in comes with its own installation application, you should use this. As a general rule, always read the documentation before installing new plug-ins.

Organizing VST 2 plug-ins

If you have a large number of VST 2 plug-ins, having them all on a single pop-up menu in the program may become unmanageable. For this reason, the VST 2 plug-ins installed with Nuendo are placed in appropriate subfolders according to the effect type.

- Under Windows, you can organize VST plug-ins by moving, adding or renaming subfolders within the Vstplugins folder.

When you launch the program and pull down an effects pop-up menu, the subfolders will be represented by hierarchical submenus, each listing the plug-ins in the corresponding subfolder.

- Under Mac OS X, you cannot change the hierarchic arrangement of the “built-in” VST plug-ins.

However, you can arrange any additional plug-ins you have installed (in the /Library/Audio/Plug-Ins/VST/ folders, see above) by placing them in subfolders. In the program, the subfolders will be represented by hierarchical submenus, each listing the plug-ins in the corresponding subfolder.

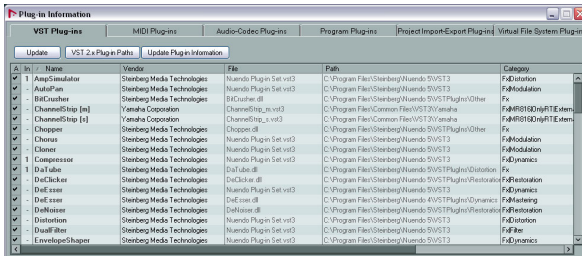
About the effects from previous Nuendo versions

Effect plug-ins from previous versions of Nuendo are available through the Steinberg web site. Go to <http://knowledgebase.steinberg.net>, search for “legacy plug-ins” and follow the link to the download page you require.

Installing older plug-ins will allow you to import projects created with previous versions of Nuendo, without loosing effect settings.

The Plug-in Information window

On the Devices menu, you will find an item called “Plug-in Information”. Selecting this opens a dialog listing all the available VST compatible plug-ins in your system (including VST instruments), along with all MIDI plug-ins.



Managing and selecting VST plug-ins

To display all available VST plug-ins, open the “VST PlugIns” tab.

- To enable a plug-in (make it available for selection), put a checkmark in the left column.

Only the enabled plug-ins will appear on the effect menus.

- The Instances column indicates how many instances of the plug-in are currently used in Nuendo. Clicking in this column for a plug-in which is already in use produces a pop-up showing exactly where each use occurs.

⇒ A plug-in may be in use even if it is not enabled in the left column.

You might for example have opened a project containing effects that are currently disabled on the menu. The left column only determines whether or not the plug-in will be visible on the effect menus.

- All columns can be resized by dragging the divider in the column header.

The other columns show the following information about each plug-in:

Column	Description
Name	The name of the plug-in.
Vendor	The manufacturer of the plug-in.
File	This shows the complete name of the plug-in (with extension).
Category	This indicates the category of each plug-in (such as VST instruments, surround effects, etc.).
Version	Shows the version of the plug-in.
SDK	Shows with which version of the VST protocol a plug-in is compatible.
Latency	This shows the delay (in samples) that will be introduced if the effect is used as an Insert. This is automatically compensated for by Nuendo.
Side-Chain Inputs	Shows the number of side-chain inputs for a plug-in.
I/O	This column shows the number of inputs and outputs for each plug-in.
Path	The path and name of the folder in which the plug-in file is located.

Update button

Clicking this button will make Nuendo re-scan the designated VST folders for updated plug-in information.

VST 2.x Plug-in Paths button

This opens a dialog where you can see the current paths to where VST 2.x plug-ins are located. You can add/remove folder locations by using the corresponding buttons. If you click “Add”, a file dialog opens, where you can select a folder location.

About the “shared” plug-ins folder (Windows and VST 2.x only)

You can designate a “shared” VST 2.x plug-ins folder. This will allow VST 2.x plug-ins to be used by other programs that support this standard.

You designate a shared folder by selecting a folder in the list and clicking the “Set As Shared Folder” button in the VST 2.x Plug-in Paths dialog.

Exporting plug-in information files

You can also save plug-in information as an XML file, e.g. for archiving purposes or troubleshooting. The Export function is available for VST, MIDI and Audio Codec plug-ins. Proceed as follows:

1. Right-click on the desired tab in the Plug-in Information window to open the context menu and select “Export”.
A file dialog opens.
2. In the dialog, specify a name and location for the Plug-in Information export file and click OK to export the file.
 - The Plug-in Information file contains information on the installed/available plug-ins, their version, vendor, etc.
 - The XML file can then be opened in any editor application supporting the XML format.

Introduction

VST instruments are software synthesizers (or other sound sources) that are contained within Nuendo. They are played internally via MIDI. You can add effects or EQ to VST instruments, just as with audio tracks.

⇒ This chapter describes the general procedures for setting up and using VST instruments.

⇒ Depending on the VST version the instrument is compatible with, an icon may be displayed in front of the instrument name, see [“About VST 3”](#) on [page 196](#).

⇒ Note that VST instruments are only supplied as part of the Nuendo Expansion Kit. You can, however, use your own VST instruments in Nuendo. The VST instrument included in the Nuendo Expansion Kit are described in detail in the separate manual “Nuendo Expansion Kit – Cubase Music Tools for Nuendo”.

VST instrument channels vs. instrument tracks

Nuendo allows you to make use of VST instruments in two different ways:

- By activating instruments in the VST Instruments window. This creates a VST instrument channel, which can be played by one (or several) MIDI track(s) routed to it.

- By creating instrument tracks.

Instrument tracks are a combination of a VST instrument, an instrument channel, and a MIDI track. You play and record MIDI note data directly for this track.

Both methods have their advantages and should be selected according to what best suits your needs. The following sections describe the two approaches.

VST instrument channels

You can access a VST instrument from within Nuendo by creating a VST instrument channel and associating this channel with a MIDI track. Proceed as follows:

1. On the Devices menu, select “VST Instruments”.

The VST Instruments window opens.



2. Click in one of the empty slots to open the instrument pop-up menu and select the desired instrument.

3. You will be asked if you want to create an associated MIDI track connected to the VST instrument. Click Create. The instrument is loaded and activated, and its control panel opens. A MIDI track with the name of the instrument is added to the track list. The output of this track is routed to the instrument.

In the Preferences dialog (VST–Plug-ins page), you can specify what happens when loading a VST instrument in an instrument slot. Open the pop-up menu “Create MIDI track when loading VSTi” and select one of the available options:

- When you select “Always”, a corresponding MIDI track will always be created.
- When you select “Do not”, no track will be created and only the instrument will be loaded.
- Select “Always ask to” if you want to decide whether a MIDI track is created whenever you load an instrument.

You can also use modifiers to specify what happens when you load a VST instrument (overriding the Preference setting):

- When you hold down [Ctrl]/[Command] while selecting a VST instrument for an instrument slot, a corresponding MIDI track with the name of the instrument is automatically created.
- When you hold down [Alt]/[Option] while selecting a VST instrument for an instrument slot, no MIDI track will be created for the instrument.

- If you do not want the plug-in control panels to open every time you load a plug-in, open the Preferences dialog (VST–Plug-ins page) and deactivate “Open Effect Editor After Loading it”.

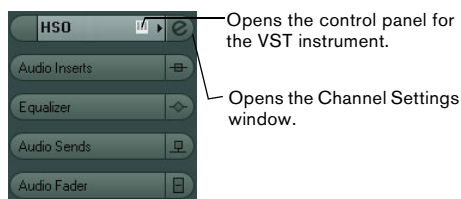
You can open a plug-in panel at any time by clicking the “e” button of the corresponding plug-in slot.

4. If you now look in the Project window track list, you will find that a dedicated folder for the chosen instrument has been added, within a “VST Instruments” folder (where all your VST instrument channels will be listed).

The separate folder for the added VST instrument contains two types of automation tracks: one for automating the plug-in parameters and one for each Mixer channel used by the VST instrument. For example, if you add a VST instrument with four separate outputs (four separate Mixer channels), the folder will contain five automation tracks. To keep the screen less cluttered, you may want to close the folder for the VST instrument until you need to view or edit any of the automation tracks. For details about automation, see the chapter “Automation” on page 239.

- When you select the MIDI track routed to the VST instrument, you will see that the Inspector contains a separate section for the instrument.

This section contains the audio channel settings for the VST instrument (inserts, EQs, Sends, and fader settings). The tab has two buttons for opening the Channel Settings window (for the VST instrument channel) and the Edit Instrument button which opens the control panel for the VST instrument.



5. Depending on the selected VST instrument, you may also need to select a MIDI channel for the track.

For example, a multitimbral VST instrument can play back different sounds on different MIDI channels – check the documentation for the VST instrument for MIDI implementation details.

6. Make sure that the “MIDI Thru Active” option is activated in the Preferences dialog (MIDI page).

7. Activate the Monitor button for the MIDI track (in the track list, Inspector, or Mixer).

When this is activated (or when the track is record enabled), incoming MIDI is passed on to the selected MIDI output (in this case the VST instrument), see the chapter “Recording” on page 90.

8. Open the Mixer.

You will find one or more channel strips for the audio outputs of the VST instrument. VST instrument channel strips have the same features and functionality as group channel strips, with the addition of an Edit button at the bottom of the strip for opening the VST instrument control panel. You will also find Output Routing pop-up menus at the top of the channel strips, e.g. for routing the VST instrument channels to output channels or groups. Routing is described in detail in the chapter “VST Connections” on page 27.

9. Play the VST instrument from your MIDI keyboard.

You can use the Mixer settings to adjust the sound, add EQ or effects, etc., just as with regular audio channels. Of course, you can also record or manually create MIDI parts that play back sounds from the VST instrument.

- ⚠ You can have up to 64 VST instruments activated at the same time, either different instruments or multiple instances of the same instrument. However, software instruments can consume a lot of CPU power – keep an eye on the VST Performance window to avoid running out of processor power (see also “Instrument Freeze” on page 220).

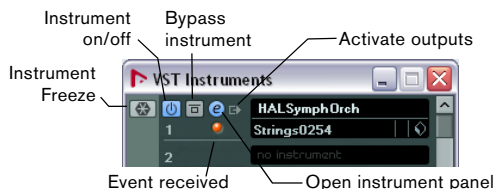
- VST instrument channels give you full access to multi-timbral instruments.

You can have several MIDI tracks routed to the VST instrument, each playing a different part.

- Similarly, you can route channels to any available output provided by the VST instrument.

The VST Instruments window

When a VST instrument is loaded, six controls are displayed for this slot in the VST Instruments window.



- The button on the far left is used for the Freeze function, see “Instrument Freeze” on page 220.

- The On/Off button is used to activate or deactivate the VST instrument.

When an instrument is selected from the instrument pop-up menu, it is activated automatically, i.e. the On/Off button is lit.

For some instruments you may also bypass the instrument by clicking the Bypass button to the right of the On/Off button.

- Click the Edit (“e”) button to open the control panel for the VST instrument.
- Below the Edit button is a small LED that will light up when MIDI data is received by the instrument.
- The rightmost button allows you to activate the desired output for the instrument.

This is useful when you are using VST instruments that have a large number of audio busses, which may be confusing. Click one of the entries in the pop-up list to activate/deactivate output busses for this instrument.

Instrument tracks

An instrument track is a combination of a VST instrument, a MIDI track, and a VST instrument channel, in other words: it is a track coupled with a sound – it allows you to think in terms of sounds rather than in terms of track and instrument settings.

Adding instrument tracks

To open and use an instrument track, proceed as follows:

1. Pull down the Project menu, open the Add Track sub-menu and select “Instrument”.

You can also right-click the track list and select “Add Instrument Track” on the context menu.

2. The Add Instrument Track dialog opens.

You can select an instrument for the track from the pop-up menu (but you can also leave this until later if you wish). Specify the number of instrument tracks you wish to create in the “Count” field. If you click the Browse button, the dialog expands to show the Presets browser, where you can browse for sounds, see [“Using the Presets browser” on page 222](#).

3. Click the Add Track button.

If you have selected an instrument in the Add Track dialog, the new track gets the name of the instrument. Otherwise, the track is named “Instrument track”.



Properties

Each instrument track has a corresponding channel strip in the Mixer.

- In the Inspector, you can select a VST instrument from the Instrument pop-up menu.

When you select an instrument from this pop-up menu, its control panel will open automatically.

- You can also exchange the “sound” of an instrument track (i.e. the VST instrument and its settings) by extracting these data from another instrument track or a VST preset, see [“Extracting sound from an instrument track or VST preset” on page 360](#).

- On the Input Routing pop-up menu, you can select a MIDI input.

Instrument tracks have only one MIDI input.

- To open the control panel for the VST instrument, click the “Edit Instrument” button in the Inspector.



- As with MIDI tracks, you can perform the usual MIDI editing procedures on the instrument track, like duplicate, split, repeat or lock the track, use the In-Place Editor, drag and drop the MIDI parts of an instrument track, etc. For more information, see the chapter [“MIDI realtime parameters and effects” on page 372](#).

- As with the MIDI track inspector and track controls, you can adjust track delay, choose MIDI input, work with VST instrument panels, etc. For more information, see the chapter [“MIDI realtime parameters and effects” on page 372](#).

- Instrument tracks have all options that VST instrument channels have, i.e. inserts, sends, EQ, etc.

⇒ VST instruments used in instrument tracks do not appear in the VST Instruments window. For an overview of all used VST instruments, open the Plug-in Information window via the Devices menu. For further information, see the section [“The Plug-in Information window” on page 213](#).

Restrictions

- Instrument tracks have no MIDI sends.
- MIDI volume and pan cannot be controlled (there is no “MIDI fader” tab in the Inspector); instead, the VST instrument volume and pan are used (via the “Channel” tab in the Inspector). This applies also to the respective automation parameters.
 - ⇒ Due to there being only one volume and pan control for the instrument track, the Mute button will mute the complete track including the VST instrument. (As opposed to a MIDI track with an assigned VST instrument, for which muting the MIDI track still allows you to monitor and record the VST instrument.)
- Instrument tracks always have one stereo output channel only. This means that VST instruments that do not provide a stereo output as their first output channel cannot be used with instrument tracks, and must be loaded via the VST Instruments window.
- Due to the limitation to one output channel, instrument tracks play only the first voice of a multi-timbral VST instrument. If you want to use all voices, you have to load the instrument via the VST Instruments window and set up a MIDI channel to play it.

Import and export options

Importing MIDI loops

You can import “MIDI loops” (file extension “*.midiloop”) in Nuendo. These files contain MIDI part information (MIDI notes, controllers, etc.) as well as all the settings that are saved in instrument track presets (see [“About track presets and VST presets”](#) on [page 221](#)). This way, you can easily reuse instrument patterns you really like in other projects or applications, for example.

Proceed as follows:

1. Open the MediaBay window via the Media menu.
2. In the Results section, open the “Show Media Types” dialog and select “MIDI Loops & Plug-in Presets” (see [“Filtering according to media type”](#) on [page 339](#)). This is not necessary, but will help you locate your MIDI loops more quickly.

3. In the Results list, select a MIDI loop and drag it to an empty section in the Project window.

An instrument track is created and the instrument part is inserted at the position where you dragged the file. The Inspector will reflect all settings saved in the MIDI loop, e.g. the VST instrument that was used, applied insert effects, track parameters, etc.

⇒ You can also drag MIDI loops onto existing instrument or MIDI tracks. However, this will only import the part information. This means this part will only contain the MIDI data (notes, controllers) saved in the MIDI loop, but no inspector settings or instrument parameters.

Exporting MIDI loops

Exporting MIDI loops is a great way of saving a MIDI part together with its instrument and effect settings. This allows you to easily reproduce patterns you created without having to search for the correct sound, style, or effect.

Proceed as follows:

1. Select the desired instrument part.
2. Pull down the File menu, open the Export submenu, and select “MIDI Loop...”.
A file dialog opens.
3. In the “New MIDI Loop” section, enter a name for the MIDI loop.
 - If you want to save attributes for the MIDI loop, click the button below the “New MIDI Loop” section at the bottom left.
The Attribute Inspector section opens, allowing you to define attributes for your MIDI loop.
4. Click OK to close the dialog and save the MIDI loop.

MIDI Loop files are saved in the following folder:

- Windows XP: \Documents and Settings\\Application Data\Steinberg\MIDI Loops
- Windows Vista and Windows 7: \Users\\AppData\Roaming\Steinberg\MIDI Loops
- Mac: /Users/<user name>/Library/Application Support/Steinberg/MIDI Loops/

This default folder cannot be changed, but you can create subfolders within this folder to organize your MIDI loops. Simply click the “New Folder” button in the Save MIDI Loop dialog.

Exporting instrument tracks as MIDI file

You can also export instrument tracks as standard MIDI files, see [“Exporting MIDI files”](#) on [page 560](#).

Please note:

- As there is no MIDI patch information in an instrument track, this information is missing in the resulting MIDI file.
- If you activate “Export Inspector Volume/Pan”, volume and pan information of the VST instrument will be converted and written into the MIDI file as controller data.

What do I need? Instrument channel or instrument track?

- If you need a particular sound without knowing which VST instrument to use, create an instrument track and use the preview features of the Presets browser to find the sound you want.
- Do likewise if the instrument track restrictions described above do not matter.
- If you are planning to create an instrument track preset, complete with inserts and EQ settings, you have to use an instrument track.
- If you need to use multitimbral parts and/or multiple outputs, set up a VST instrument channel.

Instrument Freeze

Like all plug-ins, VST instruments may require a lot of processor power. If you are using a moderately powerful computer or if you are using a large number of VST instruments, you may come to a point where your computer cannot handle all VST instruments playing back in realtime (the CPU overload indicator in the VST Performance window lights up, you get crackling sounds, etc.).

Enter the Instrument Freeze function! This is how it works:

- When you freeze a VST instrument, the program renders an audio file of the instrument output (taking into account all unmuted MIDI parts routed to that VST instrument). This file is placed in the “Freeze” folder within the Project folder.

- All MIDI tracks routed to the VST instrument, or the instrument track associated with the VST instrument, are muted and locked (the controls for these tracks will appear “grayed-out” in the track list and Inspector).
- When you start playback, the rendered audio file is played back from an “invisible” audio track, routed to the VST instrument’s Mixer channel. Thus, any effects, EQ, or mixing automation will still be applied.
- You can also freeze the Mixer channel of the VST instrument. This freezes any pre-fader insert effects for the channels, just as when freezing audio tracks (see [“Freezing \(rendering\) insert effects for a track”](#) on [page 202](#)).

The result of the Freeze is that you get exactly the same sound as before, but the computer processor does not have to calculate the sound of the VST instrument in real-time.

Performing the freeze

The instrument freeze function is available in the VST Instruments window, the track list, and the Inspector for instrument tracks.

1. Set up the project so that the VST instrument plays back the way you want it to.
This includes editing the MIDI tracks routed to the VST instrument, or editing the instrument track, and making parameter settings for the VST instrument itself. If you have automated parameter changes for the VST instrument, make sure that the Read (R) button is activated.
2. Open the VST Instruments window from the Devices menu, or, if you are using an instrument track, select the track and open the top Inspector tab.
3. Click the Freeze button for the VST instrument (the button to the left of the VST instrument slot), or the Freeze button in the Inspector for the instrument track.



The Freeze button in the VST Instruments window...



...and in the Inspector.

The Freeze Instrument Options dialog opens with the following options for the Freeze operation:



- Select “Freeze Instrument Only” if you do not want to freeze any insert effects for the VST instrument channels. Use this if you are using insert effects on the VST instrument channel(s) and want to be able to edit, replace, or remove these after freezing the VST instrument.

- Select “Freeze Instrument and Channels” if you want to freeze all pre-fader insert effects for the VST instrument channels.

If your VST instrument channels are set up with the desired insert effects and you do not need to edit these, select this option.

- You can set a Tail Size time to let sounds complete their normal release cycle.

Otherwise, the sound might be cut off at the very end of the freeze file.

- When you activate “Unload Instrument when Frozen”, the frozen VST instrument will be removed. This is useful if you are freezing an instrument that uses a lot of RAM, e.g. for pre-loading samples. By unloading the instrument, the RAM becomes available for other plug-ins, etc.

4. Click OK.

A progress dialog is shown while the program renders the VST instrument audio to a file on your hard disk.

The Freeze button lights up. If you check the Project window at this point, you will find that the relevant MIDI/instrument tracks have grayed out controls in the track list and Inspector. Furthermore, the MIDI parts are locked and cannot be moved.

5. Play back the project.

You will hear exactly the same sound as before freezing the VST instrument – but the CPU load will be considerably less!

- If you selected “Freeze Instrument and Channels”, any insert effects used by the VST instrument are also frozen (except for the post-fader inserts). However, you can always adjust level, pan, sends, and EQ for frozen VST instruments.

Unfreezing

If you need to make adjustments (either to the MIDI tracks, to the VST instrument parameters or to the VST instrument channels if these were frozen) you need to unfreeze the VST instrument:

1. Click the Freeze button for the VST instrument again (either in the VST Instruments window or in the Inspector). You will be asked to confirm this operation.

2. Click “Unfreeze”.

The tracks and VST instrument are restored and the rendered “freeze file” is deleted.

VST instruments and processor load

If you are working with VST 3 instruments, another way to relieve processor load is the “Suspend VST3 plug-in processing when no audio signals are received” option in the Preferences dialog (VST–Plug-ins page). This is described in the section [“Smart plug-in processing”](#) on [page 196](#).

Using presets for VSTi configuration

About track presets and VST presets

Track presets and VST presets allow you to quickly set up tracks or instruments with all the settings required for the sound you want. Nuendo provides various types of presets for various purposes. Two of these are of relevance for VST instruments:

- Track presets for instrument tracks store the parameter settings of a VST instrument together with all track/channel settings (applied audio and MIDI insert effects, etc.). Instrument track presets can only be applied to instrument tracks, not to instrument channels activated in the VST Instruments window.

- VST presets store all panel settings for a plug-in (VST instruments and VST effects), but no track/channel settings.

Note that you can create instrument tracks from VST 3 presets, i.e. selecting a VST 3 preset will create an instrument track with all settings stored in the VST preset plus an “empty” track.

As described in the chapter [“Audio effects”](#) on [page 195](#), there are two types of VST presets that can be used: the VST 2 standard FXB/FXP files and the VST 3 preset standard with the extension “.vstpreset”. Some of the included VST instruments use the VST 2 preset standard, and others use the VST 3 standard.

All VST 2 instruments can import FXB/FXP files and also convert them to the VST 3 standard. Once converted, you can use all VST 3 features, see [“About earlier VST instrument presets”](#) on [page 224](#).

⇒ For further information on track presets and VST presets, see the chapter [“Working with track presets”](#) on [page 356](#).

Browsing for sounds

One important and often time-consuming aspect of music creation is the search for the right sounds. You might spend a huge amount of time trying out the presets for a particular instrument only to find out later that the preset for another instrument contains the sound you were looking for.

This is why Nuendo features extensive browsing possibilities, allowing you to preview all available presets without having to load them first!

In addition, you can filter your search by specifying category, style, etc. For example, if you are looking for a bass sound, simply select the Bass category to browse and preview all bass sounds for all instruments. If you know you want a synth bass sound, select Synth Bass as subcategory to filter out all other sounds, etc.

You can also browse and preview track presets for instrument tracks, i.e. instrument sounds plus all track settings and all channel insert effect settings for this track.

These features combined speed up the process of finding the right sound immensely.

- When creating your own presets, it is always a good idea to set up attributes for them, as it allows you to fully use the browsing features for your files, too. This is described in the section [“Editing attributes \(tagging\)”](#) on [page 348](#).

Using the Presets browser

You can open the Presets browser for an existing track or when creating a new track. Proceed as follows:

- In the Add Instrument Track dialog, click the Browse button.

The dialog expands to show the Presets browser.

- Click in the “Load Track Preset” field at the top of the Inspector (above the track name) or right-click the track in the track list and select “Load Track Preset...”.

The Presets browser opens (see also [“Loading track or VST presets in the Inspector or the context menu of the track”](#) on [page 359](#)).

To find an appropriate preset, proceed as follows:

1. Select a preset from the Results list.

If needed, filter the list by activating the attributes you are looking for in the Filters section. This section is similar to the Filters section in the MediaBay, see [“The Filters section”](#) on [page 335](#).

2. Play a few notes on your MIDI keyboard to hear the preset sound. You can switch between presets and hear the sound while you play. Alternatively, you can play back/loop a MIDI part on a track.

Each time you select a preset, all associated track and/or instrument settings are automatically loaded.

3. When you have found the preset that you want, double-click on it (or click outside the Presets browser).

The preset is applied.

- To return to the preset that was selected when you opened the Presets browser, click the “Revert to Last Setting” button.

Using the “Choose Track Preset” dialog

1. Right-click the track list to open the context menu and on the Add Track submenu select “Add Track Using Track Preset...”.

The Choose Track Preset dialog opens. It contains the same sections as the Presets browser.



2. Select a preset from the Results list.

The Results section of the Choose Track Preset dialog displays all preset sounds for all track types and VST instruments.

3. To preview the presets, you have to play MIDI notes on a MIDI keyboard or load a MIDI file because there is no track connected.

The previewing options are described in detail in the section [“Previewing VST presets and track presets for MIDI and instrument tracks”](#) on page 343.

- ⚠ The Preview functions work in the same way in the MediaBay and its related dialogs. Note however that not all Preview functions available in the MediaBay are also available in the dialogs.

4. When you have found the right sound, click the Add Track button to close the dialog.

An instrument track is created with all track and/or instrument settings that were saved in the preset.

Selecting VST instrument presets

The previous sections focussed on selecting presets for the creation of new instrument tracks, or for changing the setup of an existing track. However, you can also use presets to change the settings of the VST instrument itself.

- ⚠ Note that the following refers to the selection of VST 3 presets (.vstpreset). If you want to apply .FXP/.FXB presets to your VST 2 instruments in this way, see [“About earlier VST instrument presets”](#) on page 224.

To select a VST instrument preset, proceed as follows:

1. Load a VST instrument (either in the VST Instruments window or via an instrument track).

2. If you use the VST Instruments window, select a MIDI track routed to the instrument. If you use an instrument track, select this track.

3. Make sure that the Inspector section with the basic track settings is visible.

If this is not the case, click on the track name at the top of the Inspector.

4. In the Inspector, click in the Programs field.

The Presets browser opens.



5. In the Results section, select a preset from the list.

6. Activate playback to audition the selected preset. Simply step through the presets until you find the right sound. It may be helpful to set up cycle playback of a section to make comparisons between different preset settings easier.

7. When you have found the preset that you want, double-click on it (or click outside the Presets browser). The preset is applied.

- To return to the preset that was selected when you opened the Presets browser, click the “Revert to Last Setting” button.

⇒ You can also open the Presets browser via the Presets pop-up menu in the control panel of the VST instrument.

Saving VST instrument presets

You can save your settings as presets for further use (e.g. in other projects):

1. In the VST instrument panel, click the button to the right of the preset name and select “Save Preset...”. This opens a dialog where you can save the current settings as a preset.

2. In the New Preset section, enter a name for the preset.

- If you want to save attributes for the preset, click the button below the “New Preset” section at the bottom left. The Attribute Inspector section opens, allowing you to define attributes for the preset. For further information about attributes, see [“The Attribute Inspector”](#) on [page 347](#).

3. Click OK to save the preset and exit the dialog.

Presets are saved into a default folder named VST3 Presets. Within this folder, there is a folder called “Steinberg Media Technologies” where the included presets are arranged in subfolders named after each instrument.

You cannot change the default folder, but you can add further subfolders inside the instrument’s preset folder.

- Under Windows XP, the default preset folder is in the following location: \Documents and Settings\<user name>\Application data\VST3 Presets.
- Under Windows Vista and Windows 7, the default preset folder is in the following location: \Users\<user name>\AppData\Roaming\VST3 Presets.
- Under Mac OS, the default preset folder is in the following location: /Users/<user name>/Library/Audio/Presets/<company>/<plug-in name>.

About earlier VST instrument presets

You can use any VST 2.x instrument plug-ins in Nuendo. Installing VST instrument plug-ins works the same way as for audio effects – see [“Installing additional VST plug-ins”](#) on [page 212](#).

When you install a VST 2 instrument, any previously stored presets for it will be of the old FX program/bank (.fxp/.fxb) standard. You can import such files, but the preset handling will be slightly different. You will not be able to use the new features like the Preview function or the Attribute Inspector until you have converted the old “.FXP/.FXB” presets to VST 3 presets. If you save new presets for a VST 2 plug-in these will automatically be saved in the new “.vstpreset” format in the default location.

Importing and converting FXB/FXP files

To import FXP/FXB files, proceed as follows:

1. Load any VST 2 instrument you may have installed, and click the VST Sound button to open the Preset Management pop-up menu.

2. Select the “Import FXB/FXP” option.

This menu item is only available for VST 2 instrument plug-ins.

3. In the file dialog that opens, locate the FXP file and click “Open”.

If you load a bank (.fxb), it will replace the current set of all effect programs. If you load a single program, it will replace the currently selected effect program only. Note that such files exist only if you created your own .fxp/fxb presets with a previous program version (or any other VST 2 application).

- After importing, you can convert the current program list to VST presets by selecting “Convert Program List to VST Presets” from the Preset Management pop-up menu.

When the presets are converted, they are available in the Presets browser, and you can use the Attribute Inspector to add attributes and audition the presets. The presets will be stored in the VST3 Preset folder.

About latency

Depending on your audio hardware and its ASIO driver, the latency (the time it takes for the instrument to produce a sound when you press a key on your MIDI controller) may simply be too high to allow comfortable realtime VST instrument playback from a keyboard.

If this is the case, a workaround is to play and record your parts with another MIDI sound source selected, and then switch to the VST instrument for playback.

⇒ You can check the latency for your audio hardware in the Device Setup dialog (VST Audio System page).

The input and output latency values are shown below the ASIO Driver pop-up menu. For live VST instrument playing, these values should ideally be a few milliseconds (although the limit for “comfortable” live playing is a matter of personal taste).

Constrain Delay Compensation

Nuendo features full delay compensation throughout the entire audio path. This means that any delay inherent in the VST plug-ins you use will automatically be compensated for during playback, so that all channels are kept in perfect sync (see [“About plug-in delay compensation”](#) on [page 197](#)).

However, when you play a VST instrument in realtime or record live audio (with monitoring through Nuendo activated), this delay compensation may sometimes result in added latency. To avoid this, you can activate the Constrain Delay Compensation button on the Project window toolbar. This function tries to minimize the latency effects of the delay compensation, while maintaining the sound of the mix as far as possible.



▪ In the Preferences dialog (VST page) you will find a setting called Delay Compensation Threshold. Only plug-ins with a delay higher than this setting will be affected by the Constrain Delay Compensation function.

▪ VST plug-ins (with higher delay than the threshold value) which are activated for VST instrument channels, audio track channels that are record enabled, group channels and output channels will be turned off when you activate Constrain Delay Compensation.

▪ VST plug-ins activated for FX channels are not turned off but their delay is disregarded by the program (delay compensation is turned off).

After recording or using a VST instrument with Constrain Delay Compensation, turn off the function in order to restore full delay compensation.

External instruments

An external instrument bus is an input (return) to your audio hardware, along with a MIDI connection via Nuendo and few additional settings. External instrument busses are created in the VST Connections window. All external instrument busses you have created will appear on the VST Instrument pop-up menus and can be selected in the same way as any VST instrument plug-in. If you select an external instrument, you play it via MIDI as usual (you have to create a MIDI device to play it) and the sound (synth audio output) will come in to the VST environment where you can apply processing, etc. For more information on external instruments, see [“Setting up external instruments”](#) on [page 34](#).

Introduction

Nuendo has integrated surround sound features with support for several formats. This support goes all the way through the audio path: all audio-related channels (i.e. audio and instrument tracks as well as group channels) and busses can handle multi-channel speaker configurations (up to 12 channels). A channel in the Mixer can either carry complete surround mixes, or an individual speaker channel which is part of a surround setup.

Nuendo offers the following surround-related features:

- Audio-related tracks can be routed freely to surround channels.
- The SurroundPanner V5 plug-in is automatically applied to audio-related tracks with a supported surround configuration and to output channels with a multi-channel configuration (other than stereo). It is available in the Inspector and Mixer and can be used to graphically position channels in the surround field. The plug-in is described in detail in the section [“Using the SurroundPanner V5”](#) on [page 230](#).
- The MixConvert plug-in allows conversion of one surround channel into another with a different speaker configuration. Nuendo places MixConvert automatically where needed. For more information about MixConvert, see [“Using the MixConvert plug-in”](#) on [page 237](#).
- Nuendo supports surround-specific plug-ins, that is plug-ins with multi-channel support specifically designed for surround sound mixing tasks (the included “Mix8to2” plug-in is an example of this). Furthermore, any VST3 plug-in features multi-channel support and can therefore be used in a surround configuration, even if it was not specifically designed for surround. This is described in detail in the section [“Using effects in multi-channel configurations”](#) on [page 199](#). All plug-ins are described in the separate PDF document “Plug-in Reference”.
- You configure Nuendo for surround sound by defining input and output busses in the desired surround format and specifying which audio inputs and outputs are used for the different channels in the busses, see [“Preparations”](#) on [page 229](#).

Deliverables

The result of a surround mix in Nuendo is either the multi-channel audio sent from the surround output bus to your dubber, or (if you use the Export Audio Mixdown feature) audio file(s) on your hard disk. Exported surround mixes can either be split (one mono file per speaker channel) or interleaved (a single file containing all the surround channels).

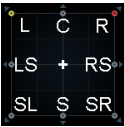

Available surround configurations

The following surround configurations are supported in Nuendo:

Format	Description
LRCS	LRCS refers to Left Right Center Surround, where the surround speaker is center-rear positioned. This is the original surround format that first appeared as Dolby Stereo in cinema and later as the home cinema format Dolby ProLogic.
5.0	This is the same as 5.1 (see below) but without the LFE channel. The LFE channel is optional in 5.1 and if you do not plan to use it, you might find this option more convenient.
5.1	This is the most popular surround format in cinema and DVD. In its various encoding implementations (established by different manufacturers), it is referred to as Dolby Digital, AC-3, DTS, and MPEG-2 Multichannel. 5.1 has one center speaker (mainly used for dialogue), main left and right speakers, and two surround speakers (mostly for sound effects). Additionally an LFE (Low Frequency Effects) subchannel with lower bandwidth is used for special low frequency effects.
LRC	Same as LRCS, but without the surround speaker channel.
LRS	Left-Right-Surround, with the surround speaker positioned at center-rear.
LRC+Lfe	Same as LRC, but including an LFE subchannel.
LRS+Lfe	Same as LRS, but including an LFE subchannel.

Format	Description
Quadro 	The original Quadraphonic format for music, with one speaker in each corner. This format was intended for vinyl record players.
LRCS+Lfe 	Same as LRCS, but including an LFE subchannel.
Quadro+Lfe 	Same as Quadro, but including an LFE subchannel.
6.0 Cine 	A Left-Right-Center front speaker arrangement with three surround channels (Left-Right-Center).
6.0 Music 	This uses two front channels (Left/Right) with Left and Right surround channels and Left and Right Side channels.
6.1 Cine 	Same as 6.0 Cine but with an LFE subchannel added. This speaker arrangement is used in the Dolby Digital EX and DTS-ES formats.
6.1 Music 	Same as 6.0 Music, but including an LFE subchannel.

Format	Description
7.0 Cine 	A Left, Mid-left, Center, Mid-right, Right front speaker arrangement with Left and Right surround channels.
7.0 Music 	Same as 6.0 Music, but including a Center front channel.
7.1 Cine 	Same as 7.0 Cine but with an LFE subchannel added. This arrangement is used in the Sony Dynamic Digital Sound (SDDS) format.
7.1 Music 	Same as 7.0 Music, but including an LFE subchannel.
8.0 Cine 	Same as 7.0 Cine, but including a Center Surround channel.
8.0 Music 	Same as 7.0 Music, but including a Center Surround channel.
8.1 Cine 	Same as 8.0 Cine, but including an LFE subchannel.

Format	Description
8.1 Music	Same as 8.0 Music, but including an LFE subchannel.
	
10.2	This is an experimental format with ten surrounding speakers and two LFE channels (a combination of two 5.1 set-ups, one at the top and one at the bottom of the room).
	

Preparations

Output bus configuration

Before you can start working with surround sound, you have to configure a surround output bus, through which all the speaker channels of the selected surround format are routed. How to add and set up busses in the VST Connections window is described in detail in the section “[Setting up busses](#)” on [page 28](#).

Child busses

A child bus is a bus within a (wider) bus. The most obvious application of a child bus is to create stereo busses within your surround bus – this allows you to route stereo tracks directly to a stereo speaker pair within the surround bus. You may also want to add child busses in other surround formats (with fewer channels than the “parent bus”).

Once you have created a surround bus, you can add one or several child busses to it by right-clicking the bus and selecting “Add Child Bus”. This is described in detail in the section “[Adding child busses](#)” on [page 31](#).

Routing

In the Routing panel of the Mixer, you can use the Output Routing pop-up menu to route audio-related tracks to output busses or group channels with a surround configuration. For details on routing, see “[Routing](#)” on [page 168](#).

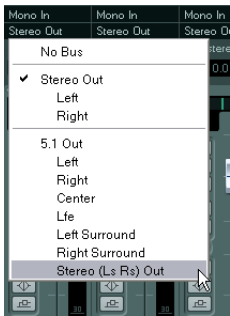
Routing channels to individual surround channels

If you want to place an audio source in one separate speaker channel, you can route it directly to that speaker channel. This is useful for premixed material or multi-channel recordings that do not require panning.

- To do this, simply select an individual speaker channel in the Output Routing pop-up menu.
- If a stereo audio channel is routed directly to a speaker channel, the left/right channels are mixed to mono. The pan control for the audio channel governs the balance between the left and right channel in the resulting mono mix. Center pan will produce a mix of equal proportion.

Routing channels to child busses

If you have added a child bus within a surround bus (see above), it appears as a subentry of the surround bus on the Output Routing pop-up menu. Select this option to route a stereo audio channel directly to that stereo speaker pair of the surround bus (e.g. to route a music track directly to the left and right front speakers in a surround channel).



Input bus configuration

To work with surround sound in Nuendo, it is often not necessary to configure a surround format input bus. You can record audio files via standard inputs, and easily route the resulting audio channels to surround outputs at any stage. You can also directly import multi-channel files of a specific surround format onto audio tracks of the same format.

You should add a surround input bus in the following circumstances:

- You have existing audio material in a specific surround format, and you wish to transfer this material into Nuendo as a single, multi-channel file.

- You wish to record a surround setup “live”.
- You have prepared surround premixes (e.g. stems) that you want to record on a new audio track with a surround configuration.

Using the SurroundPanner V5

Nuendo has a special feature for graphically positioning a sound source in the surround field or modifying existing premixes: the SurroundPanner V5. This plug-in distributes the audio from the input channels in various proportions to the output surround channels.

Whether the SurroundPanner V5 can be used for a specific input/output configuration, depends on whether this configuration can be mapped by the panner. The plug-in supports mapping of mono or stereo inputs to any surround configuration, as well as setups where the input and output channels have the same configuration. In all other cases (e.g. 5.1 to stereo), the MixConvert plug-in is used to map the channel configuration (see [“Using the MixConvert plug-in”](#) on [page 237](#)).

While you need to open the plug-in panel to access all of the panner features, you can perform basic panning operations also in the following places:

- In the Mixer, a miniature view of the surround plug-in appears at the top of the fader section in the channel strip. You can click and drag directly in the miniature image to move the signal source in the surround field. The volume slider to the right controls the LFE level (if available for the selected surround format).

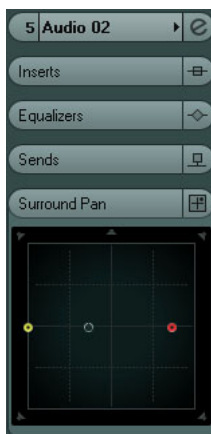


- To view a slightly larger version of the miniature surround control in the extended Mixer panel, select the Panner option on the View Options pop-up menu.

This panner view offers click and drag panning, speaker channel icons reflecting the solo/mute and deactivation states, as well as numerical values for left/right balance, front/rear balance, and LFE amount. You can enter values directly or using the mouse wheel.



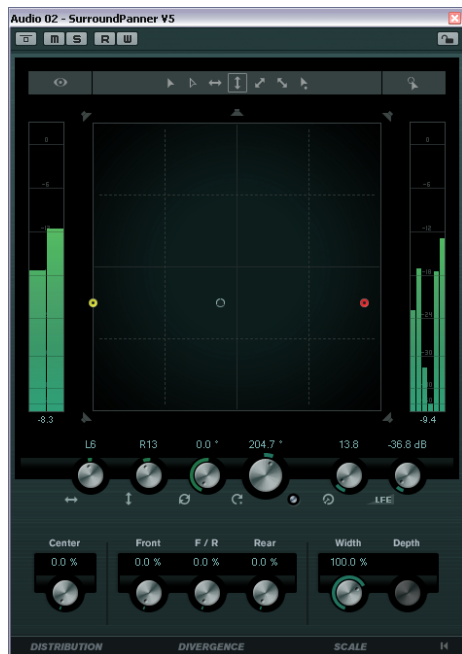
- In the Inspector, a miniature surround pan control can be displayed on the Surround Pan tab. This panner view offers click and drag panning as well as speaker channel icons reflecting the solo/mute and deactivation states.



- ⇒ In all miniature panner views you can scale down your movements by holding the [Shift] key while moving the sound source. This allows you to make fine adjustments.

The plug-in panel

Double-click on any of the miniature panner controls to open the plug-in panel in a separate window.



The SurroundPanner V5 plug-in offers numerous possibilities to position any supported type of sound source, whether mono, stereo, or multi-channel. If you work visually oriented, you can simply drag the sound source around in the pan area. To help you execute very exact movements you can use modifier keys to limit the movement direction (e.g. for straight front/rear panning).

To perform rotating movements that you cannot achieve by dragging the mouse, you can use the powerful rotation and orbit controls below the pan area. Here you will also find parameters for controlling the signal distribution to the different speaker channels and the advanced scaling controls with which you can influence the size of the sound source itself.

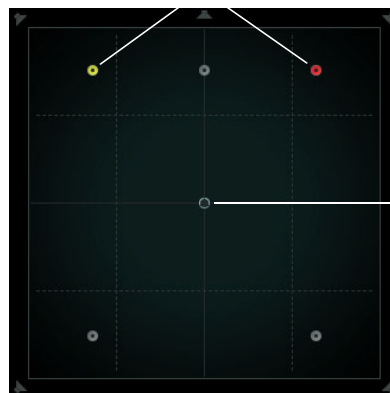
To the left and right of the surround field there are volume meters, showing the input and output levels of all speaker channels. For a detailed description of all the panning options available in the SurroundPanner V5, see below.

Positioning signals in the pan area

In the pan area, you see a graphical representation of the sound source, with the different input channels shown as gray balls – except for the left and right front channels that are shown in yellow and red. Here, you can position the sound source using the mouse:

- By clicking at the desired position in the pan area.
When you release the mouse button, the sound source jumps to that position (with the positioning handle, i.e. the circle located in the center of the sound source, ending up where you clicked).
- By clicking and dragging the positioning handle.
Note that you do not have to click exactly on the handle in order to move it. You can click anywhere in the pan area and start moving the mouse, the handle then moves in the same direction as the mouse.

Left and right front channels



The pan area showing a 5.1 sound source

The positioning handle can be positioned freely in the pan area and even be moved out of the pan area. The panning balls, though, will never move further out than the edge of the surround field (which is indicated by a gray line). Moving the positioning handle out of the pan area can be useful for extreme panning positions, such as panning all channels hard right.

⇒ For mono channels there is no positioning handle. Click and drag the input channel to position it.

Speaker channels – Solo and Mute vs. Disabling

The speakers that are distributed around the surround field represent the output configuration. You can disable speakers or solo/mute them.

This speaker is muted. This speaker is soloed. This speaker is disabled.



- [Alt]/[Option]-click on a speaker symbol to disable that speaker (the speaker symbol is grayed out) so that no audio will be routed to this surround channel. The signal that would otherwise be sent to this speaker is distributed to the other speakers instead. For example, you can disable the center speaker for all stems of a film mix except the dialogue to make sure that only dialogue is sent to that speaker.

Note that the signal is distributed in such a way that the power level stays constant all the time (see [“Constant power”](#) on [page 237](#)).

- Click on a speaker symbol to solo that speaker (the speaker symbol turns red). That way you will only hear the signal sent to this speaker. All other speakers are muted (yellow speaker symbol). This can be used for testing purposes, e.g. to make sure that a signal is sent to a specific speaker as intended.

Note that you can solo several speakers at the same time by clicking on them one after the other. By [Ctrl]/[Command]-clicking on a speaker symbol, this speaker is soloed exclusively, and all other speakers are muted.

⇒ Solo and Mute cannot be automated!

Restricting movement

By default, you can click anywhere in the pan area and drag the mouse to move the sound source. If you want the positioning handle to jump to a specific position, you can click once at that position.

However, you can also limit movement to a specific direction, using the corresponding modifier keys (or the arrow icons above the pan area). That way you can scale down your movements, or have the sound source move along a certain axis (e.g. from bottom left to top right).

- When you press a modifier key (e.g. [Ctrl]/[Command]), the corresponding icon above the pan area is highlighted with a lighter border, indicating that this mode is active. As soon as you release the modifier key, you return to standard mode.

- By clicking on one of the icons above the pan area, the corresponding positioning mode is activated persistently. That way you do not have to keep the corresponding modifier key pressed all the time.

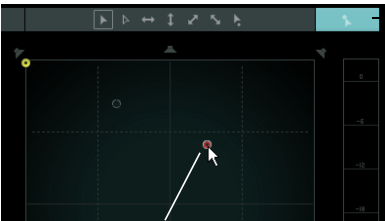
To deactivate the selected positioning mode, switch back to standard mode.

The following modes are available:

Icon	Modifier key(s)	Description
	-	Standard mode, no restrictions apply.
	[Shift]	Mouse movements are scaled to allow very fine movements. This is useful when panning in the miniature display in the channel strip, for example.
	[Ctrl]/[Command]	Horizontal movements only.
	[Ctrl]/[Command]-[Shift]	Vertical movements only.
	[Alt]/[Option]	Diagonal movements only (bottom left to top right).
	[Alt]/[Option]-[Shift]	Diagonal movements only (bottom right to top left).
	[Shift]-[Ctrl]/[Command]-[Alt]/[Option]	In this mode the mouse pointer immediately jumps to the positioning handle even if it is located outside the pan area (only visible in Overview Mode).

Panning the left and right channels independently with the mouse

At the top right of the plug-in window you will find the button for the independent positioning mode. If this is activated, you can adjust the front left and right input channels (yellow and red balls) independently by clicking and dragging. This is similar to using the two surround pan joysticks found on some hardware consoles.



The independent positioning mode is activated.

The right front channel is panned independently with the mouse.

⇒ To move one of the panning balls in this mode, you do not have to click directly on them. You will always move the panning ball that is nearer to the position of the mouse pointer.

⚠ When panning in independent positioning mode, automation data is written for several parameters. Due to this, special automation rules apply, see “Automation” on page 236.

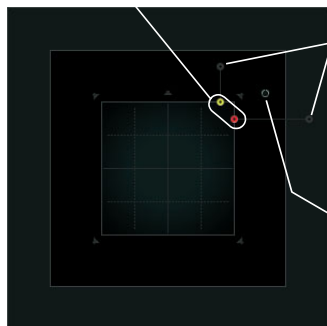
⚠ Automation data for the independent positioning mode is always written for the complete sound source, not for individual channels. This means it is not possible to record automation for one stereo channel and then add automation for the other stereo channel in a second go, for example.

Overview Mode

When moving the sound source in the pan area, you will notice that the positioning handle can leave the visible pan area (although the channel panning balls cannot). It can be moved so far outside that all channels end up on the perimeter where the positioning handle left the area. If you now use one of the rotation controls, for example, it can be quite hard to understand what is happening, i.e. why the panning balls are moving the way they are.

To get a better understanding of this behavior, you can switch to Overview Mode. Here you can see where the positioning handle is actually located and where the panning balls would be (if they could leave the pan area). These virtual or “ghost” positions are connected to the actual panning balls inside the surround field by a thin line to help you understand complex movements.

The left and right channels cannot leave the pan area.



“Ghost” images of the panning balls. These are the theoretical positions outside the visible pan area.

The positioning handle is located outside the pan area.

▪ To switch to Overview Mode, click on the eye icon above and to the left of the pan area.

⇒ The Overview Mode is only used for visualizing the complex scenarios that you can create with the Surround-Panner V5. The actual panning is done in the standard view. Therefore, the speakers are visible in this mode, but cannot be soloed/muted or disabled.

Left-right and front-rear panning



These two controls are used to pan the sound source from left to right and front to rear, and vice versa. This can be useful when an object moves through the scene, e.g. a car driving through from the left to the right or a spaceship passing overhead.

⇒ This is the same as restricting the movement direction using the [Ctrl]/[Command] and [Ctrl]/[Command]-[Shift] modifiers.

Rotating signals



The Rotate Signal control is used to rotate the source channels around the positioning handle. All input channels circle around the handle (but they cannot move beyond the borders of the surround field).

Usually, you would use this control on a premixed stem, i.e. a group channel that already has surround qualities. For example, if you are working on a scene where the camera turns around, you can rotate the surround sound source within the surround field of the output bus to imitate this behavior.

Orbit controls



The Orbit controls are used to rotate the sound source (including all input channels and the positioning handle) around the center of the surround field.

Orbit Center

This is the main control that allows you to perform the rotation. For example, you can use this if a person walks around in a scene and can still be heard when walking “behind the audience”.

Counter Shot

The Counter Shot control is used to rotate the sound source by exactly 180°, thereby “flipping” the surround image to the opposite side.

For example, this can be used when working on a close-up scene of two people sitting face to face with a lot of reverse shots. With the Counter Shot button you can then flip the surround field each time that the camera switches from perspective A to perspective B or back.

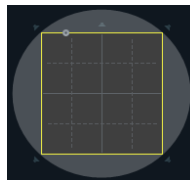
⇒ This control is best applied to premixes (e.g. the ambience stem) so that you only have to press the button once for each cut.

Tip: When panning a scene with reverse shots with less than 180° (so that you cannot use the Counter Shot button) you can make the necessary adjustments for the first perspective of the reverse shot manually, write this as automation and use the punch log function to save this setup. Repeat this for the second perspective, and afterwards use the punch log entries to switch between the two perspectives with just a click. For more information about this, see [“The Punch Log section” on page 259](#).

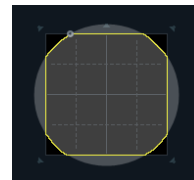
Radius

When using the Orbit Center control, the Radius encoder allows you to control the distance of the sound source from the center of the surround field (without changing the angle).

An example:



a) Radius = 141.4



b) Radius = 116.5

The gray circle shows the theoretical path of the sound source when orbiting the center. Since the sound source cannot leave the pan area, it moves along the perimeter instead. At the maximum radius setting (a) the theoretical path lies outside the pan area so that the sound source stays on the perimeter all the time; at a smaller setting (b) the circle is smaller and the sound source moves inside the pan area in the corners.

⇒ The Rotate Signal, Orbit Center, and Radius controls are endless rotary encoders so that there is no limit as to how far left or right you can rotate the sound source.



In terms of automation, the Orbit Center, Counter Shot, and Radius controls are not independent parameters as such. Instead, a combination of different automation parameters is used. For more information, see [“Automation” on page 236](#).

The LFE encoder



Use the LFE encoder in the plug-in panel to set the signal amount sent to the LFE (Low Frequency Effects) channel. You can also set this using the LFE level slider to the right of the panner in the Mixer channel strip, or by typing in a number in the LFE value field in the panner shown in the extended Mixer view.

- If the selected input already contains an LFE channel (x.1 configuration), it is routed through the SurroundPanner V5 and the LFE encoder is used to control the volume of this channel.

- If the selected input does not contain an LFE channel (x.0 configuration), all input channels are distributed evenly to the output LFE channel. In this case, it might be useful to raise the volume of this “downmix” using the LFE encoder.

⇒ The LFE channel is used as a full range channel, no low-pass filtering is applied.

Center Distribution



The Center Distribution control is used to distribute part or all of the center signal to the left and right front speakers.

For example, this can be useful in the following situation: The center signal is panned directly to the center speaker and the Center Distribution is set to 0%. However, the signal is too discrete for your liking, and you want to add part of the signal to the left and right front speakers to widen it. You can do this by raising the Center Distribution value. At 100%, the center source is provided entirely by the phantom image created by the left and right speakers and using a value in between you can distribute the signal to the three speakers.

A blue line at the top of the surround field indicates the distance up to which a phantom signal is added. If you position the source signal inside this range, the signal is sent to all three channels.

⚠ Note that for this to work, the front speaker configuration needs to be symmetrical and there can never be more than 3 speakers involved.

Divergence controls



The three divergence controls (Front, F/R, and Rear) determine the attenuation curves used when positioning sound sources for X-axis front, Y-axis (front/rear), and X-axis back. If all three controls are set to 0%, positioning a sound source on a speaker sets all other speakers to zero level. With higher values, the other speakers receive a percentage of the sound source.

Blue horizontal and vertical lines visualize the effects when changing the divergence settings.

For example, by using the front divergence, you can acoustically intensify the distance from the action on screen as perceived by the viewer.

- At 0% the perception is very focussed (concentrated in one spot). This can be used for movements close to the camera to intensify the feeling that something is taking place right in front of the viewer.
- At 100% the perception is very diffuse (hard to locate). This can be used for actions that are taking place at the far back of the scene, giving the audience the feeling that it is far away from the action.

⇒ The Center Distribution value and the front divergence are combined. If the front divergence is set to 100%, the Center Distribution has no effect.

Scaling



The Scale controls allow you to control the horizontal (Width) and vertical (Depth) expansion of the sound source. 100% corresponds to the complete width or depth of the surround field. If you reduce both values to 0%, the distance is reduced to zero and all source channels are centered in one spot.

These controls influence the perception of spatiality and ambience, as well as the traceability of signals.

- At 100% you get a very transparent, clear sound that conveys much spatiality.
- At 0% the signal is less transparent and movements cannot be traced easily.

⇒ The Depth parameter is only available for configurations with front and rear channels.

Input and output level meters

The meters to the left and right of the pan area show the volume of all input and output speaker channels, respectively. The numeric values below the meters indicate the peak level that has been measured for any of the channels.

General plug-in controls

The Bypass Effect button

At the top left of the plug-in panel you will find a button to bypass the SurroundPanner V5. If this is activated, the input signals are directly routed to the output channels (in case of an identical input and output configuration). If the output configuration is different from the input configuration, the panner attempts to route the input signals to the appropriate output channels (e.g. the left and right front speakers if panning a stereo signal to a 5.1 configuration).

⇒ When using the SurroundPanner V5 as an insert effect, this button has the same function as the Bypass Effect button available for all audio plug-ins (see [“Deactivating vs. bypassing”](#) on page 198).



Mute/Solo buttons

At the top of the plug-in panel you will find a Mute and a Solo button that are identical with the channel's Mute/Solo controls (see [“Using Solo and Mute”](#) on page 159).

⇒ These buttons are not present when the SurroundPanner V5 is used as an insert effect.

Read/Write buttons

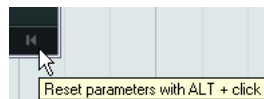
Like any other effect plug-in, the SurroundPanner V5 has Read and Write buttons at the top of the window to apply and record automation data (see below). When the panner is used on an output channel, these buttons are identical with the channel's Read and Write buttons. When used as an insert effect, automation data for this insert is written separately.

Automation

Most of the parameters in the SurroundPanner V5 plug-in can be automated just like any other channel or insert parameter (see [“Enabling and disabling the writing of automation data”](#) on page 240).

Recording automation for the Orbit controls and the independent positioning mode is handled differently, however. Automation data for these parameters is written as a combination of the front-rear panning, left-right panning and the Rotate Signal parameters. For the independent positioning mode, Scaling is added. Due to this you cannot easily modify existing automation data since this would involve too many different parameters. If an automation pass did not yield the desired result, simply try again.

Resetting all parameters

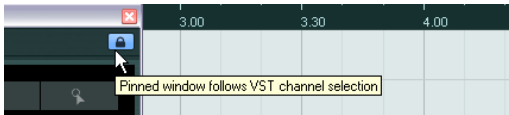


[Alt]/[Option]-click the Reset button in the lower right corner of the plug-in panel to reset all controls to their default values.

Pinning the SurroundPanner V5 window

When working with multiple channels in a surround configuration, the screen might become overcrowded with plug-in windows and you can easily lose track of where each panner window belongs.

If you want to work with only one panner window at a time, you can open the SurroundPanner V5 for one of your channels and activate the “Pinned window follows VST channel selection” button at the top of the plug-in panel. When you now select a different channel or bus, the settings for the new channel are displayed in the same window.



“Pinned window follows VST channel selection” is activated

Standard panners and the MixConvert plug-in are also shown in the pinned window. However, if you select a channel for which no panner view is available, the pinned window continues to show the last available panner view. In this case the panner view will not be consistent with the selected channel.

- If necessary, you can still open additional SurroundPanner windows by double-clicking the corresponding miniature panner view in the Mixer channel strip (or the extended Mixer view).

These “auxiliary” panner views will have no “Pinned window follows channel selection” indicator.

- ⚠ A panner instance cannot be opened in more than one window at once. If “Pinned window follows VST channel selection” is activated and you step through your channels (e.g. in the Mixer), those channels with “auxiliary” windows are skipped.

Constant power

“What goes in, must come out again.” This principle can be taken literally with regard to the SurroundPanner V5. It means that the power of a source channel is identical to the power of the corresponding output signal.

The advantage of this is that the overall volume as perceived by the listener (= the power) is always the same, regardless of the signal panning, e.g. when you move the sound source in the pan area, disable specific speaker channels, or use the divergence controls.

Using older projects with the SurroundPanner V5

If you load a project that was created with a previous version of Nuendo and still uses the old SurroundPan plug-in, you can either continue using the old panner plug-in or switch to the SurroundPanner V5 plug-in. To do this, right-click the miniature panner view of the corresponding track in the Mixer and select the “SurroundPanner V5” option from the context menu.



Switching to the SurroundPanner V5.

- ⚠ The automation data for the SurroundPan plug-in and the SurroundPanner V5 are not compatible. If you switch to the new panner, you will have to delete any existing panner automation for the corresponding track and write new automation data. If you want to keep working with the existing data you have to use the SurroundPan plug-in!

Using the MixConvert plug-in

MixConvert is a special plug-in that converts one multi-channel audio source into another multi-channel destination. It is most frequently used to “downmix” a multi-channel surround mix into a format with fewer channels (a 5.1 surround mix into a stereo mix for example).

This plug-in can be used as an insert effect in the Mixer like other plug-ins but it also has special functions. Nuendo automatically inserts MixConvert instead of the SurroundPanner V5 when the channel (audio track, group channel, etc.) is routed to a destination with fewer audio paths. MixConvert is also inserted in place of any aux send panner when the destination has a different audio path than the source.

The MixConvert plug-in is described in detail in the separate PDF document “Plug-in Reference”.

⇒ There is one exception to this behavior. When a stereo channel is routed to a mono destination through the channel routing or an aux send routing, a normal stereo panner will appear. However, this panner will control the balance of the left and right channels as they are blended into the mono destination. The center position blends both channels together by equal amounts. With the pan set all the way to the left, only the left channel can be heard, and vice versa.

Exporting a surround mix

When you have set up a surround mix, you can choose to export it using the Export Audio Mixdown function.

You have the following export options when working with a surround configuration:

- Export to “split” format, resulting in one mono audio file for each surround channel.
- Export to interleaved format, resulting in a single multi-channel audio file (e.g. a 5.1 file, containing all six surround channels).
- Under Windows you can also export a 5.1 surround mix to a file in Windows Media Audio Pro format.

This is an encoding format tailored for 5.1 surround – see “[Windows Media Audio Pro files \(Windows only\)](#)” on [page 480](#).

For details about exporting to files, see the chapter “[Export Audio Mixdown](#)” on [page 473](#).

Introduction

In essence, automation means recording the values for a particular Mixer or effect parameter. When you create your final mix, you will not have to worry about having to adjust this particular parameter control yourself – Nuendo will do it for you. Automation is a key feature when mixing in complex, multi-track projects.

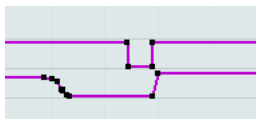
Working with automation curves

Within a Nuendo project, the changes in a parameter value over time are reflected as curves on automation tracks.

About automation curves

There are two kinds of automation curves: “ramp” and “jump”:

- Jump curves are created for on/off parameters such as Mute.
- Ramp curves are created for any parameter that generates continuous multiple values, such as fader or encoder movements, etc.



Examples of jump and ramp automation curves

About the static value line

When you are not using virgin territory (see “[Virgin territory vs. the initial value](#)” on [page 245](#)) and you open an automation track for the first time, it does not contain any automation events (unless you have previously adjusted the corresponding parameter with Write automation activated). This is reflected in the event display as a straight horizontal black line, the “static value” line. This line represents the current parameter setting.

- If you have manually added any automation events or used write automation for the corresponding parameter and then disable the reading of automation data, the automation curve will be grayed-out in the event display and the static value line will be used instead.

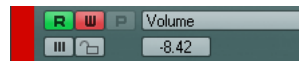
As soon as Read is enabled, the automation curve will become available.

Enabling and disabling the writing of automation data

You can automation enable tracks and Mixer channels in Nuendo by activating their automation Write buttons. Write (W) and Read (R) buttons for all plug-in effects and VST instruments can be found on the corresponding control panels.



The Write and Read buttons for a channel in the Mixer and for an automation track in the track list



- If you activate Write for a channel, virtually all Mixer parameters you adjust during playback for that specific channel are recorded as automation events.
- If Read is activated for a channel, all your recorded Mixer actions for that channel are performed during playback.

The Read and Write buttons for a track in the track list are the same as the Read and Write buttons in the corresponding channel strip in the Mixer.

⇒ Note that the Read button is automatically enabled when you enable the Write button. This allows Nuendo to read existing automation data at any time. You can separately deactivate Write if you want to only read existing data. It is not possible to activate Write and deactivate Read at the same time.

There are also global Read and Write indicator buttons (“Toggle Read/Write for all tracks”) in the common panel of the Mixer and at the top of the track list:



The global Read/Write buttons in the Mixer, and in the track list



These buttons light up as soon as there is an enabled Read or Write button on any channel/track within your project. Furthermore, they can be clicked to activate or deactivate the Read/Write buttons of all tracks simultaneously.

⇒ You will also find global Read/Write buttons on the Automation panel, see [“The Read/Write buttons”](#) on [page 248](#).

Writing automation data

There are two approaches you can use to create automation curves: manually (see [“Manual writing of automation data”](#) on [page 241](#)) and automatically (see [“Automatic writing of automation data”](#) on [page 241](#)). While manual writing makes it easy to quickly change parameter values at specific points without having to activate playback, automatic writing lets you work much like you would using a “real” mixer.

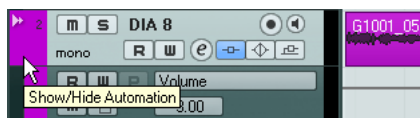
With both methods, any applied automation data will be reflected in both the Mixer (a fader will move for example) and in the corresponding automation track curve.

Automatic writing of automation data

Every action you perform is automatically recorded on automation tracks which you can later open for viewing and editing.

To enable the recording of automation events, proceed as follows:

1. Open an automation track by clicking on the “Show/Hide Automation” button of a track in the track list.



2. Enable the Write button for the track and adjust the desired parameters in the Mixer, in the Channel Settings window, or in the effect control panel while rolling through the project.

The value settings are recorded and displayed as a curve on the automation tracks. When automation data is being written, the color of the automation track changes to red and the delta indicator in the automation track shows the relative amount by which the new parameter setting deviates from any previously automated value.

3. When you are finished, stop playback and return to the position where you started playback.

4. Disable Write.

The Read button remains enabled.

5. Start playback.

All actions you recorded will be reproduced exactly.

⇒ When dragging a plug-in to a different insert slot on the same channel, any existing automation data will move with the plug-in. When you drag it to an insert slot on a different channel, any existing automation data will not be transferred to the new channel.

Manual writing of automation data

You can add automation events manually by drawing automation curves on an automation track. Proceed as follows:

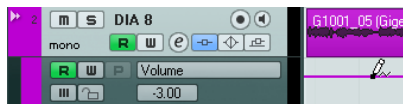
1. Open an automation track by clicking on the “Show/Hide Automation” button of a track in the track list.
2. In the track list, click on the automation parameter name and select the desired parameter from the pop-up menu.

3. Select the Pencil tool.

You can also use various modes of the Line tool for drawing curves, see below.

4. Click on the static value line.

An automation event is added, read automation mode is automatically activated, and the static value line changes to a colored automation curve.



5. If you click and hold, you can draw a curve by adding many automation events.

Note that the track color in the track list changes to red to indicate that automation data is being written.



6. When you release the mouse button, the number of automation events is reduced, but the basic shape of the curve remains the same.

This “thinning out” of events is governed by the Reduction Level setting in the Settings section of the Automation panel, see [“Reduction Level”](#) on [page 260](#).



7. If you now activate playback, the automated parameter will change with the automation curve.

In the Mixer, the corresponding fader moves accordingly.

8. Repeat the procedure if you are not happy with the result.

If you draw over existing events, a new curve is created.

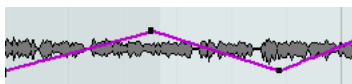
Apart from the Pencil tool, you can use the following tools to draw automation events:

- **Arrow tool**

If Read is activated and you click on an automation track with the arrow tool, you can add automation events. Note that events introduced between two existing events that do not deviate from the existing curve are removed as soon as you release the mouse button (see [“Reduction Level!”](#) on [page 260](#)).

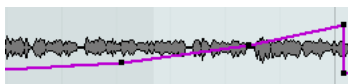
- **Line tool – Line mode**

If you click on the automation track and drag with the Line tool in Line mode, you can create automation events in a line. This is a quick way to create linear fades, etc.



- **Line tool – Parabola mode**

To activate the Line tool in Parabola mode, click on the Line tool and click again to open a pop-up menu where you can select the Parabola option. If you click and drag on the automation track with the Line tool in Parabola mode, you can create more “natural” curves and fades. Note that the result depends on the direction from which you draw the parabolic curve.



- **Line tool – Sine, Triangle, or Square mode**

To activate the Line tool in these modes, click on the Line tool and click again to open a pop-up menu where you can select the desired option. If you click and drag on the automation track with the Line tool in Sine, Triangle, or Square mode and snap to grid is activated, the period of the curve (the length of one curve “cycle”) is determined by the grid setting. If you press [Shift] and drag, you can set the period length manually, in multiples of the grid value.



⇒ The Line tool can only be used for ramp type automation curves.

Editing automation events

Automation events can be edited much like other events. You can cut, copy, paste, group, and nudge events, etc.

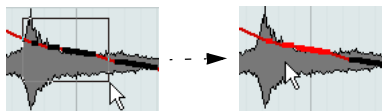
Selecting automation events

- To select a single automation event, click on it with the Arrow tool.

The event turns red, and you can drag it in any direction between two events.

- To select multiple events, you can either [Shift]-click on the events or drag a selection rectangle with the Arrow tool.

All events inside the selection rectangle will be selected.



Drawing a selection rectangle around events to select them.

- To select all automation events on an automation track, right-click the automation track in the track list and choose “Select All Events” from the context menu.



Removing automation events

There are several ways to remove events:

- By selecting events and pressing [Backspace] or [Delete] or selecting Delete from the Edit menu, or by clicking on an event with the Erase tool.

This will remove the events. The curve is redrawn to connect the remaining events.

- By selecting a range (with the Range Selection tool), and pressing [Backspace] or [Delete] or selecting Delete from the Edit menu.

When “Use Virgin Territory” is enabled, this will create a gap. When “Use Virgin Territory” is disabled, this will remove the events within the range, but the curve will be redrawn to connect new events at the start and end of the selected range (see also [“Gaps”](#) on [page 246](#)).

- By clicking on the automation parameter name in the track list and selecting “Remove Parameter” from the pop-up menu.

This will remove all automation events from the automation track, and the automation track will be closed.

Automation track operations

Most of the tracks in your project have automation tracks, one for each automated parameter. Automation tracks are hidden by default.

Opening automation tracks

To open an automation track for a channel, proceed as follows:

- Position the mouse pointer over the lower left corner of the track and click the arrow icon (“Show/Hide Automation”) that appears.

Click here to open an automation track.

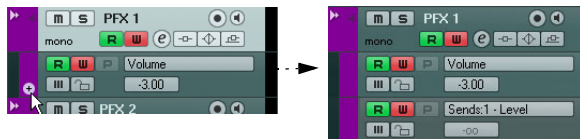


- Right-click the track in the track list and select “Show Automation” from the context menu.

The event display shows a straight black horizontal line as well as a grayed out mirror image of the audio events’ waveform (or MIDI events for MIDI tracks). By default, the Volume parameter is assigned to the first automation track.

- To open another automation track, position the mouse pointer over the lower left corner of an automation track, and click the “+” sign (“Append Automation Track”) that appears.

By default, the new automation track shows the next parameter in the Add Parameter list (see below).



You can click the “Append Automation Track” button (the “+” sign) for the automation track several times to open additional automation tracks.

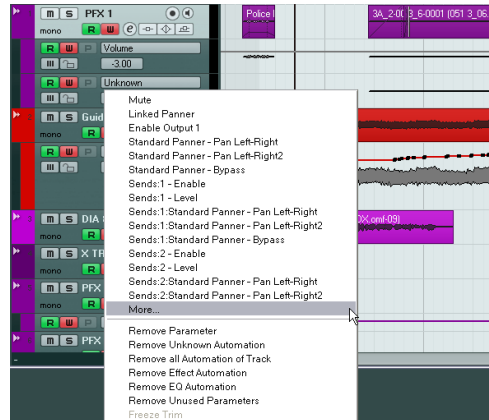
Assigning a parameter to an automation track

Default parameters are already assigned to automation tracks when you open them, according to their order in the Add Parameter list.

To select which parameter an open automation track displays, proceed as follows:

1. Open an automation track and click on the automation parameter name.

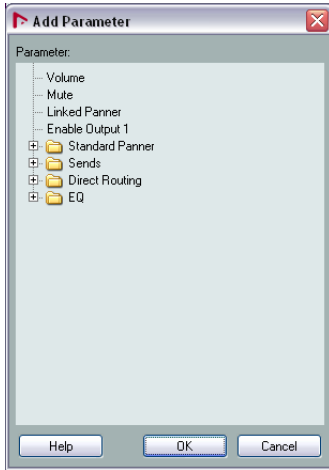
A parameter list is shown. The contents depend on the track type.



- If the parameter you wish to automate is available on the pop-up menu, you can select it directly.
- If you wish to add a parameter not available on the pop-up menu or if you want to view all parameters that can be automated, proceed with the next step.

2. Select “More...”.

The Add Parameter dialog opens. This dialog shows a list with all parameters that can be automated for the selected channel (sorted into different categories), including the parameters for any assigned insert effects. To view the parameters in a category, click the “+” sign for the corresponding category folder.

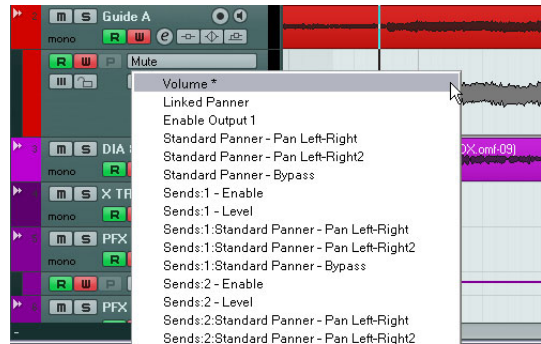


The Add Parameter dialog for an audio track

3. Select a parameter from the list and click OK.

The parameter will replace the current parameter in the automation track.

Note that the “replacing” of the parameter displayed in the automation track is completely non-destructive. If the automation track contains any automation data for the parameter you just replaced, this data is there, although it is not visible. By clicking on the automation parameter name in the track list, you can switch back to the replaced parameter. On the pop-up menu, all automated parameters are indicated by an asterisk (*) after the parameter name.



Automated parameters

Repeat the above procedure to assign a parameter to each available automation track.

⇒ Tempo changes cannot be automated on automation tracks. This is done using the tempo recording function in the Tempo Track Editor, see [“Recording tempo changes”](#) on [page 456](#).

Removing automation tracks

- To remove an automation track together with all automation events, click the parameter name and select “Remove Parameter” from the pop-up menu.
- To remove all automation tracks from a track that do not contain automation events, select “Remove Unused Parameters” from any of its automation parameter name pop-up menus.
- To remove automation tracks, you can also use the Delete options on the Functions pop-up menu of the Automation panel, see [“The Functions pop-up menu”](#) on [page 251](#).

Showing/hiding automation tracks

- To hide a single automation track, position the pointer over the top left border of the automation track in the track list and click the “Hide Automation Track” button (the “-” sign).
- To hide all automation tracks for a track, right-click the corresponding track, and select “Hide Automation” from the context menu.

- To hide all automation tracks for all tracks in the track list, right-click any track and select “Hide All Automation” from the context menu.

This option is also available on the Track Folding submenu of the Project menu.

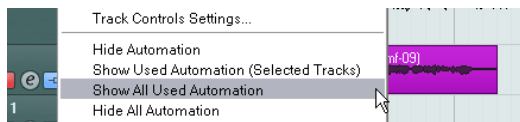
- To show or hide automation tracks, you can also use the options in the Show section of the Automation panel, see “The Show options” on page 260.

Showing only used automation tracks

If a lot of automation tracks are used, it may be impractical to have them all open in the track list. If you want to view only the automation tracks that are used (i.e. those that actually contain automation events), do one of the following:

- To close all automation tracks not containing automation events, right-click any track in the track list and select the “Show All Used Automation” option from the pop-up menu.

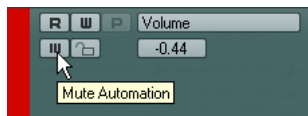
This option is also available on the Track Folding submenu of the Project menu.



- To close all automation tracks for the selected track that do not contain any automation events, right-click a specific track and select the “Show Used Automation (Selected Tracks)” option from the context menu.

Used automation tracks will be left open.

Muting automation tracks



You can mute individual automation tracks by clicking their Mute buttons in the track list. This allows you to turn off automation for a single parameter.

The “Automation follows Events” setting

If you activate the “Automation follows Events” option on the Edit menu (or in the Preferences dialog, on the Editing page), automation events will automatically follow when you move an event or part on the track.

This makes it easy to set up automation related to a specific event or part, rather than to a specific position in the project. For example, you can automate the panning of a sound effect event (having the sound pan from left to right, etc.) – if you need to move the event, the automation will automatically follow!

The rules are:

- All automation events for the track between the start and end of the event or part are moved.
- If there are automation events at the new position (to which you move the part or event), these are overwritten.
- If you copy an event or part, the automation events are duplicated as well.

Virgin territory vs. the initial value

⚠ When we speak of “touching a control” in the following sections, we mean both clicking a parameter control on the Nuendo program interface and physically touching a fader or other control on a remote control device.

Before we go into detail about the various modes and options available on the Automation panel, we need to explain how Nuendo handles those sections of your project in which you have not yet performed an automation pass.

For parameter automation, Nuendo works either with an initial value or with “virgin territory”.

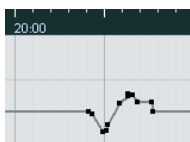
It is very important that you understand the difference between these two concepts and their individual advantages and disadvantages before continuing.

The initial value

An initial value is always used when “Use Virgin Territory” is disabled in the Automation Settings (see [“Automation Preferences”](#) on [page 260](#)).

When no automation data exists for a particular parameter, the starting point of an automation pass is saved as the initial value. When you punch out of the automation pass, it is this initial value to which the parameter will return.

This has one very important consequence: As soon as the initial value is set, the corresponding parameter is fully automated for the complete track, at any given timecode position of the project – even if your automation pass lasted only 2 seconds.



The straight line after the last automation event corresponds with the initial value.

When you release a control, it returns to the value defined by the automation curve – even when in Stop mode.

Virgin territory

Think of virgin territory as the “state” of the automation track before performing the first automation pass. When you enable the “Use Virgin Territory” option, no automation curve is displayed on the automation track, and you have full manual control of the parameter.

The idea here is that you find automation only where you actually perform an automation pass – there is no initial value to which the parameter can return.

Gaps

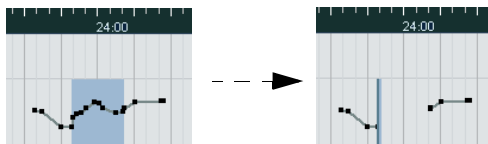
After an automation pass you will find virgin territory only to the right of the last automation event. “Empty” sections between two automation curves are referred to as “gaps” in the following sections.



Only the dynamic change in the parameter is automated.

If you want to create gaps inside a section with automated values, proceed as follows:

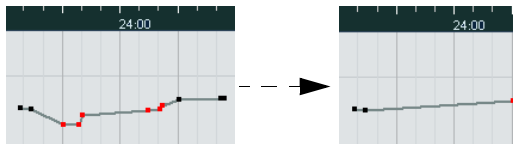
1. Open the Automation Settings and make sure that “Use Virgin Territory” is enabled (see [“Automation Preferences”](#) on [page 260](#)).
2. Select the Range Selection tool.
3. On an automation track with existing automation data, select a range and press [Delete] or [Backspace].
A gap is created.



New events at the beginning and the end of the selection range mark the end point of the automation curve (to the left) and the start of the next automation curve (to the right of the gap).

- When you select one or more events of an automation curve with the Arrow tool and press [Delete] or [Backspace], no gap is created.

Instead, the selected events are deleted. The curve between the deleted events is replaced by a new line connecting the two events to the left and right of the deleted events.



The “Terminator” setting

You can “force” any automation track into using virgin territory, by defining any automation event on the automation curve as the “terminator” point of this part of the curve. This will automatically delete the line between this event and the next one, creating a gap.

⇒ Note that this is independent of the setting for “Use Virgin Territory” – you can create gaps at any time.

- To define an event as the last point in an automation curve, select it by clicking on it, and in the Event info line in the Project window, set “Terminator” to Yes.



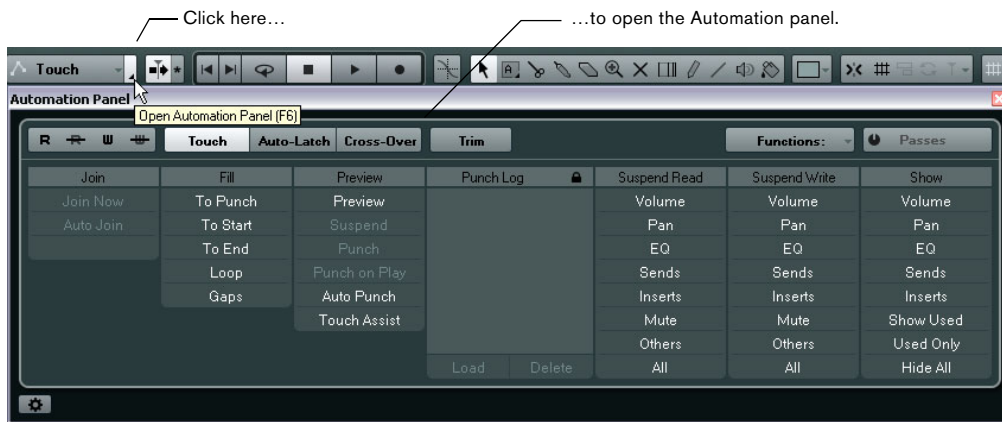
If you select an event and set “Terminator” to Yes...



...a gap is created.

- When you set the “Terminator” option for the last (right-most) automation event of an automation curve to “Yes”, any automation data to the right of this event (as defined by an initial value) is deleted.

The Automation panel



The Automation panel is a floating window, similar to the Mixer and Transport panel, and can be left open while you work. The Project window will always have the focus.

To show the Automation panel, open the Project menu and select the Automation Panel option or click the “Open Automation Panel” button on the Project window toolbar.

The Read/Write buttons

In the upper part of the Automation panel, you will find Read and Write buttons. These are used to globally enable or disable the Read and Write buttons on all tracks.



- Click “Activate Read for all tracks” to enable all Read buttons on all tracks/channels of your project. Clicking “Deactivate Read for all tracks” will disable all Read buttons.
- Click “Activate Write for all tracks” to enable all Write buttons (and, at the same time, all Read buttons) on all tracks/channels of your project. Clicking “Deactivate Write for all tracks” will disable all Write buttons. The Read buttons will remain enabled.

Automation modes

Nuendo provides three different punch out modes for automation, available on the upper part of the Automation panel and on the Automation Mode pop-up menu on the Project window toolbar.



Selecting the automation mode on the Automation panel...



...and on the Project window toolbar.

The three modes available are “Touch”, “Auto-Latch”, and “Cross-Over”. In all three modes, automation data will be written as soon as a parameter control is touched in play mode. They differ in the way the writing of automation data is ended, i.e. in their “punch out” behavior.

⇒ The automation mode set on the Automation panel or the Project window toolbar is used globally for all tracks of your project. If you want to select a different automation mode for individual tracks, select the track and on the “Track Automation Mode” pop-up menu in the Inspector choose the corresponding option.

Note that you can change the automation mode at any time, i.e. in play or stop mode or during an automation pass. You can also assign key commands to the automation modes, see [“Automation key commands”](#) on [page 261](#).

The current automation pass will always punch out as soon as one of the following conditions is met, independent of which automation mode is selected:

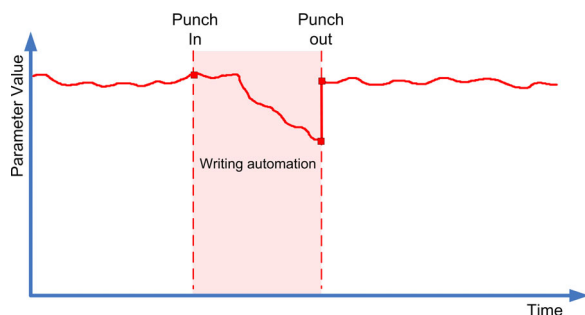
- If you disable Write.
- If you stop playback.
- If you activate Fast Forward/Rewind.
- If the project cursor reaches the right locator in Cycle mode.
- If you click in the ruler to move the project cursor (this is user-definable and can be controlled via the Automation panel, see [“Automation Preferences”](#) on [page 260](#)).

Touch

Typically, you use Touch mode in situations where you want to make a change lasting only a few seconds to an already set up parameter.

As the name implies, Touch will write automation data only for as long as you actually touch a parameter control – punch out occurs as soon as you release the control.

After punch out, the control will return to the previously set value. The Return Time setting (see [“Automation Preferences”](#) on [page 260](#)) determines how long it takes for the parameter to reach the previously set value.

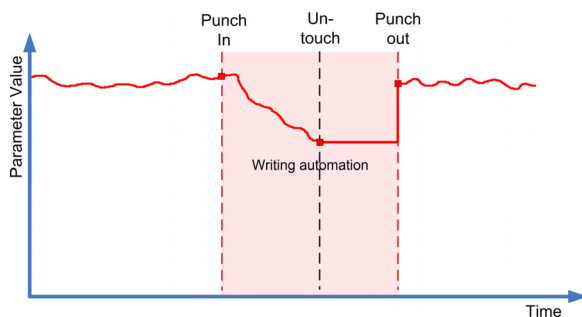


Auto-Latch

In Auto-Latch mode, there is no specific punch out condition other than those valid in all modes, see above.

Auto-Latch is useful in situations where you want to keep a value over a longer period of time – for example when making EQ settings for a particular scene.

Once your pass has started, the writing of automation data continues for as long as playback lasts or Write is enabled. When you release the control, the last value is kept until you punch out.



⇒ The automation mode for On/Off switches is always Auto-Latch (even if another mode is selected globally or for the track).

Cross-Over

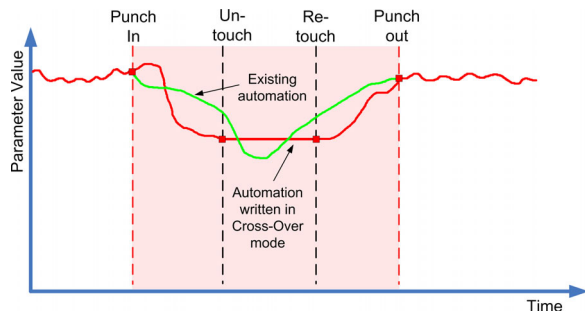
The Cross-Over mode is a kind of “manual return time” option (see [“Automation Preferences”](#) on [page 260](#)). The Cross-Over mode can be used in situations where you are not satisfied with an automation curve or with the automatically applied return settings. Cross-Over mode allows you to perform a “manual return” to ensure smooth transitions between new and existing automation settings.

For Cross-Over, the punch out condition is crossing over an already existing automation curve after touching the parameter for a second time.

Like in Auto-Latch mode, once the automation pass begins with the first touching of the parameter control, automation data is written for as long as playback lasts.

When you have found the correct value setting, you can release the fader – the automation pass continues, with the value setting remaining the same.

Now, re-touch the fader and move it towards the original value. As soon as you cross the original curve, punch out occurs automatically.



Trim

Trim allows you to update data from a previous pass by adding or removing automation data.

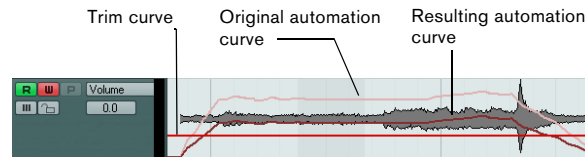
⇒ Trim works for channel volume and aux send level adjustments.

When enabling Trim on the Automation panel, a trim curve is positioned in the exact middle position of your automation track. You can use the trim curve to modify the original automation curve. Just drag the trim curve up or down and add automation events to it. These increase or decrease the values of the original automation curve, but allow you to preserve the original data.

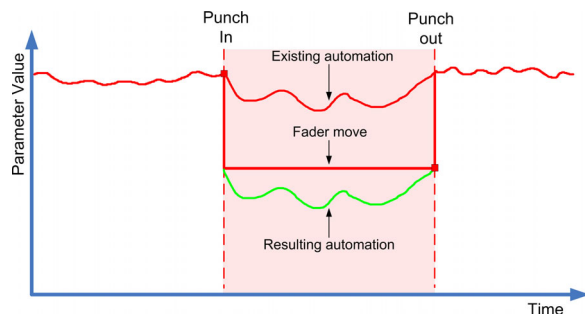
Trim data is edited like any other automation data and it is stored with the project. When Trim is activated, all editing and recording affects the trim curve. When you deactivate Trim, the original automation curve will be reset and gets active so that you can edit it.

You can use Trim either in Stop or in Play mode:

- In Stop mode, you can select one of the Fill options (see [“The Fill options”](#) on page 254) and edit the trim curve manually by clicking on it and moving it up or down. The original automation curve is displayed in a lighter color and its values are merged with the trim curve. The resulting automation curve is displayed in a darker color.



- In Play mode, the events of the original automation curve are trimmed as the project cursor passes over them.

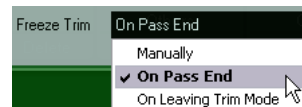


Trim in Play mode, in combination with Fill to Punch

Freeze Trim

You can freeze your trim curve automatically or manually and render all trim data into a single automation curve.

To freeze your trim curve automatically, open the Freeze Trim pop-up menu in the Automation Settings and select “On Pass End” to perform a freeze whenever a write operation is finished, or “On Leaving Trim Mode” to freeze the trim data when Trim mode is switched off (globally or individually for a track).

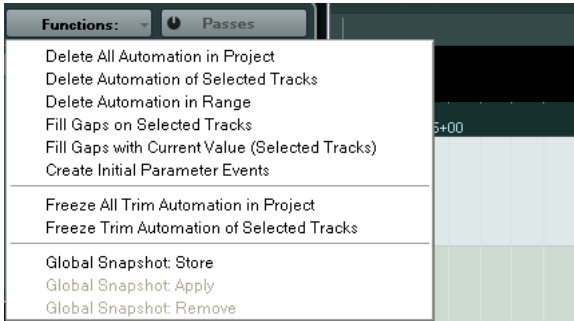


To freeze your trim curve manually, select the corresponding option on the Freeze Trim pop-up menu in the Automation Settings (see [“Automation Preferences”](#) on [page 260](#)). You have the following possibilities to freeze your trim data manually:

- On the automation track, click on the parameter name and select the “Freeze Trim” option from the pop-up menu to freeze a specific parameter of one track.
- Open the Functions pop-up menu on the Automation panel and select “Freeze All Trim Automation in Project” to freeze all tracks in the project.
- Open the Functions pop-up menu on the Automation panel and select “Freeze Trim Automation of Selected Tracks” to freeze all selected tracks.

The Functions pop-up menu

At the top right of the Automation panel, you will find the Functions pop-up menu, which contains a number of global automation commands.



The following functions are available:

Function	Description
Delete All Automation in Project	This removes all automation data from your project.
Delete Automation of Selected Tracks	This removes all automation data for the selected track(s).
Delete Automation in Range	This deletes all automation data between the left and right locators on all tracks.

Function	Description
Fill Gaps on Selected Tracks	This option is used with virgin territories (see “Virgin territory vs. the initial value” on page 245). Select this option to fill any gaps in the automation curves of the selected tracks with a continuous value. The value of the last event (the end point) of a section is used to fill the gap. This value is written across the gap up to one millisecond before the first event of the next automated section. A new event is inserted here; the value will be ramped to the next automated section.
Fill Gaps with Current Value (Selected Tracks)	This option is used with virgin territories (see “Virgin territory” on page 246). Select this option to fill any gaps in the automation curves of the selected tracks. The gaps will be filled with the current value of the corresponding control.
Create Initial Parameter Events	This function creates and stores the initial automation values for each automatable parameter in the Mixer. For parameters that have not been automated yet, automation events are created at the current parameter position, i.e. at value 0. As initial parameter events are created on all channels, all channels will have automation data, even if you did not add automation to them. If this is not what you want, use the Global Snapshot function instead (see “About the Global Snapshot options” on page 251).
Freeze All Trim Automation in Project	This freezes all trim automation for all tracks in the project, see “Freeze Trim” on page 250 .
Freeze Trim Automation of Selected Tracks	This freezes all trim automation for the selected tracks, see “Freeze Trim” on page 250 .
Global Snapshot: Store	Use this function to save all automatable Mixer parameters as a snapshot.
Global Snapshot: Apply	Use this function to apply the stored snapshot.
Global Snapshot: Remove	Use this function to remove the stored snapshot.

About the Global Snapshot options

It is possible to save Mixer settings for automatable mixer parameters. These can be reapplied later, e.g. if you have accidentally overwritten your parameters.

The global snapshot options are a quick way to save a backup copy of your automatable Mixer parameters and to reapply them later. Snapshots can be used to store values only for parameters that have been changed.

Snapshots are saved with the project.

You can only save one snapshot at a time. By storing a snapshot, a previously stored snapshot may be overwritten!

Working with Automation Passes

An automation pass begins with the first parameter that is written after activating Write automation and starting playback. It ends when playback stops, either when you click the Stop button or when the position cursor jumps to another position (e.g. because Cycle or Arranger mode is activated). You can undo automation passes in the Automation Pass history.

To work with automation passes, proceed as follows:

- 1. Enable the “Activate Automation Passes” button at the top right of the Automation panel.

The Passes button is enabled to the right.

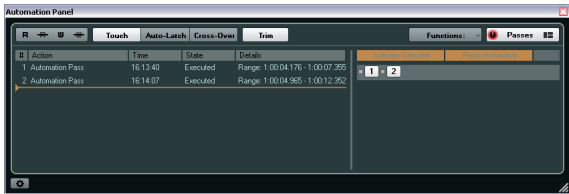
- 2. Click the Passes button to open the automation pass history.

When you open the history for the first time, it will be empty.



- 3. Activate write automation and perform some actions.

The “Activate Automation Passes” button turns red to indicate that an automation pass is running.



- 4. When you have written automation passes that you want to undo, drag the horizontal line upwards with the mouse or use the key command [Ctrl]/[Command]-[Alt]/[Option]-[Z] for “Undo Pass”.

The corresponding automation events on the automation track are removed and the entries in the Automation pass history are grayed out. The State column displays “Undone” instead of “Executed”.

- ⚠ All automation that you performed manually as well as other edits and processes performed during or after the automation passes will also be undone.

- 5. If you want to redo automation passes again, drag the horizontal line downwards with the mouse or use the key command [Ctrl]/[Command]-[Alt]/[Option]-[Shift]-[Z] for “Redo Pass”.

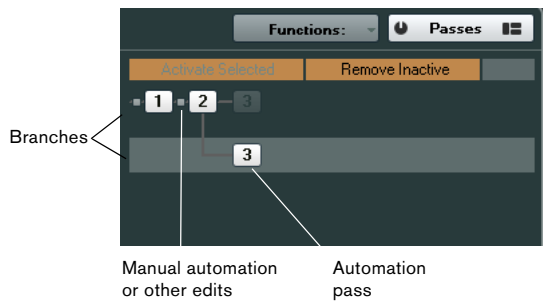
The corresponding automation events on the automation track will be inserted and the State column shows “Executed” again.

⇒ Automation passes are not created when you write automation manually. If you want to undo manually written automation events use the Edit History instead (see “The Edit History dialog” on page 79).

Using Undo Branches

If you activate the “Use Undo Branches” option in the Automation Settings or in the Preferences dialog (General page), the use of branches is enabled. Branches are useful if you want to experiment with different automation variations/settings.

A branch is a sequence of automation passes. In a branch each automation pass is represented by a rectangle with the number of the automation pass. Automation that you perform manually, as well as other edits and processes in between automation passes, are represented by smaller rectangles. These rectangles only serve as indicators, they cannot be used to undo the edits.



When you undo an automation pass and subsequently write new automation, a new branch is created and all following automation passes are gathered in the new branch.

If you have two or more branches, you can choose to undo the automation passes of the separate branches in the automation pass history by activating and deactivating specific branches.



The automation pass history with two branches

To deactivate a specific branch, proceed as follows:

1. Click on a branch in the right section of the dialog to select it.

The actions of the selected branch are displayed in the left section of the dialog.

2. Click the “Activate Selected” button to deactivate all subsequent branches.

The button turns gray and all automation passes from the subsequent branches are undone. The automation passes of the activated branch are redone until the branch ends, i.e. the first edit(s) of a following branch will be merged back into it.

- If you want to activate a deactivated branch, select the desired branch and click the “Activate Selected” button. You can also double-click on a branch to select and activate it at the same time.

- If you want to undo and delete a branch, click the “Remove Inactive” button.

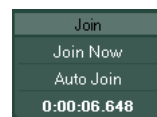
All branches will be removed. The actions of the inactive branch will disappear completely whereas the actions of the active branches will be merged.

⚠ The removing of inactive branches cannot be undone!

3. When you are done, click “Activate Automation Passes” to return to the regular Automation panel.

⇒ The automation pass history is not saved with the project, i.e. if you close your project, the history is deleted.

The Join options



When several editors work on the same project simultaneously, running automation passes often have to be interrupted. The Join options help you to resume write automation on controls that were active at the point where the transport stopped by storing which parameters were punched in on stop. Nuendo allows you to resume interrupted automation passes.

⚠ The Join options are not available in Touch mode!

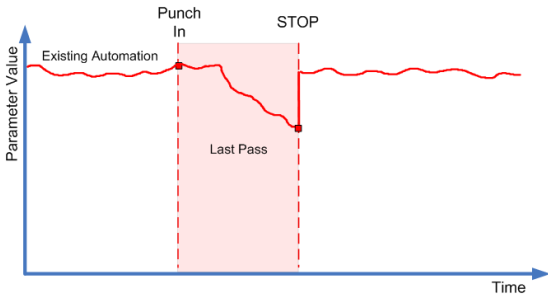
The following Join options are available:

Join Now

If you hit Stop and want to resume automation manually, proceed as follows:

1. Start playback and watch the automation curve.
2. When the cursor reaches the desired position, click Join Now on the Automation panel.

All parameters from the last pass are punched in and the last value is written for the whole section. All previous automation events will be overwritten.

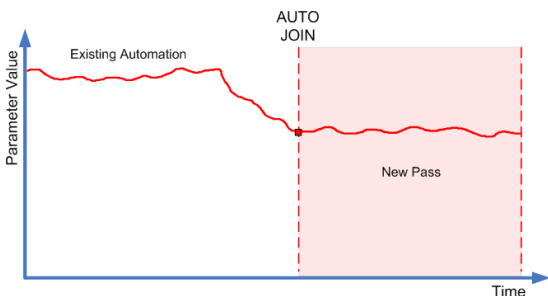


Auto Join

If you hit Stop and want to resume automation automatically, proceed as follows:

1. Activate “Auto Join” on the Automation panel.
2. Start playback.

All parameters from the last pass are punched in automatically at the position where you hit stop. This position is indicated by the Join indicator (see below).



Join indicator

The Join indicator shows the timecode position where the last automation pass was stopped, i.e. the point where the Auto Join will automatically occur. When automation is resumed, this indicator is updated.

The Fill options

Fill
To Punch
To Start
To End
Loop
Gaps

The Fill options define what happens in a specific section of your project when you punch out of a running automation pass.

The Fill options write one particular value across a defined section of your automation track – any previously created data within this section is overwritten.

The following Fill options are available:

To Punch

Let's say you are rolling, in realtime, over a scene cut and volume must be softer in the next scene – you do not yet know how much softer, but the change in volume from the first to the second scene must be abrupt.

1. Select “Touch” as automation mode and click the “To Punch” button once to activate it as Fill option. The “To Punch” button is highlighted.

The “To Punch” button is highlighted.

2. Start rolling somewhere during the first scene and touch the fader at the moment of scene change. The automation pass is punched in.

The automation pass is punched in.

3. Move the fader until you have found the volume setting you need in the second scene and release the fader to punch out.

The volume curve is set from the point of punch out back to where you punched in. The values written while moving the fader to find the right value are deleted, and the volume jumps at exactly the right moment from the value set in the first scene to the value found for the second scene.

To Start

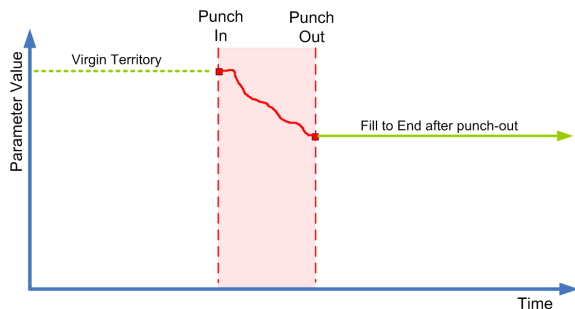
“To Start” is similar to the “To Punch” option, but with the following difference: When “To Start” is selected, punching out of automation will fill the automation track from where you punched out to the start of the project.

To End

Imagine you are automating volume for the background tracks of a two-minute scene. Rather than holding the fader for two minutes, you can proceed as follows:

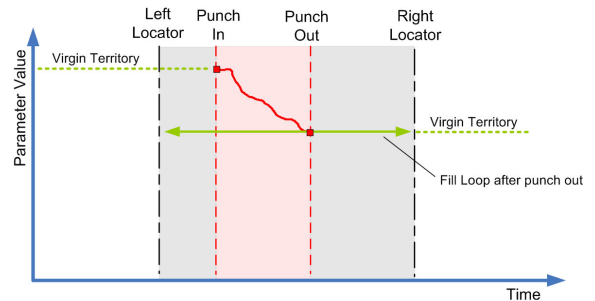
1. Select “Touch” as automation mode and click the “To End” button once to activate it as Fill option. The “To End” button is highlighted.
2. Start rolling and touch the parameter control to punch in the automation pass.
3. Move the fader until you have found the setting you want and release the fader.

This will punch out the writing of automation data. As you let go of the fader, the automation curve will take the found value setting, from where you punched out to the end of the project.



Loop

To use the Loop option, you must first set up a loop range with the left and right locators. When you then select Loop, punching out will set the found value within the range defined by the left and right locator.



Gaps

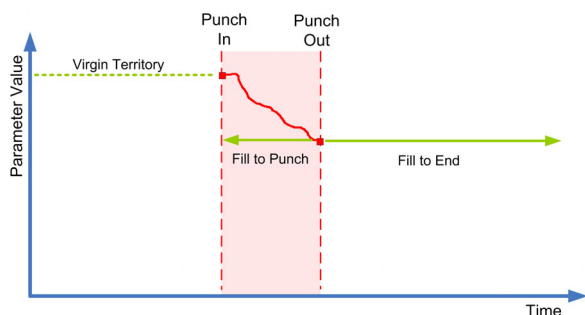
This option is used only in combination with virgin territory. This is explained in detail in the section “[Virgin territory](#)” on [page 246](#). When “Gaps” is selected, punching out of automation will fill any gaps between previously written automation events with the last value found during the last automation pass.

⚠ When “Trim” is active, the Gaps option will have no effect. This is because Trim will only modify already existing data.

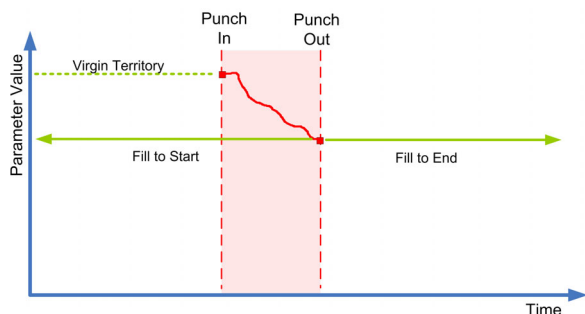
Fill combinations

You can also combine the various Fill options.

- Combining “To Punch” and “To End” will fill the automation track from the punch in position to the end of the project.



- Combining “To Start” and “To End” will fill the automation track from the beginning to the end of the project.



- You can also combine the Fill options with the Preview options (see [“The Preview options”](#) on [page 256](#)), and when writing automation manually with the Pencil tool. Editing automation events is explained in more detail in the section [“Editing automation events”](#) on [page 242](#)). This is a very fast and efficient way to move through your project.

Feel free to experiment!

One shot vs. continuous fill

The Fill options can be used in two different ways:

- When you click one of the Fill buttons, it is highlighted, and will be enabled during the next automation pass. Afterwards, the option is disabled again.
- If you click a Fill button a second time, a lock symbol is displayed on the highlighted button, indicating that you are permanently in “Fill to X” mode and that the operation can be repeated as many times as you wish. Clicking the button for a third time disables the corresponding Fill option.

Drawing curves with Fill enabled

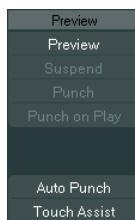
You can use the Fill options on the Automation panel in combination with the Pencil tool. This provides you with an extremely powerful method for writing automation data manually:

- Open an automation track and select the Pencil tool.
- On the Automation panel in the Fill column select “To End”.
- Click and draw to create an automation curve.
- Release the mouse button.

At the moment of release, a final automation event is created. The automation curve is written from this last event through to the end of the project.

This procedure can be used with all the Fill options.

The Preview options



The Preview options allow you to find new settings without recording the steps needed to locate them.

This is useful if you want to audition changes on automation values without deleting any of the original automation data. When you have found the desired settings, you can punch the previewed value.

The Preview workflow

The Preview workflow has three different phases: touch-collecting the required parameters, finding the required values, and performing the actual automation pass. Proceed as follows:

1. In the Preview section click the Preview button. The Preview button is highlighted.

⇒ You can set the Preview mode permanently by clicking the Preview button two times. A lock symbol is displayed on the highlighted button. You can disable this by clicking the button for a third time.

2. Touch a parameter control.

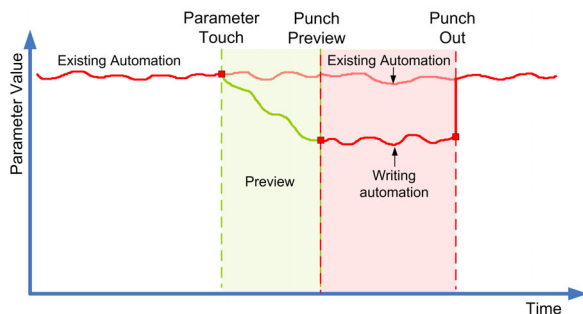
Below the Preview button three other buttons (Suspend, Punch and Punch on Play) are displayed. You now have full manual control of the touch-collected parameter, suspending (but not deleting!) any previously recorded automation data. You may now touch-collect another parameter, if you want to write data for several parameters during the same automation pass.

▪ Note that each automation track has its own Preview button.



Clicking this button will enable Preview mode for this particular automation track. This is touch-collecting via automation tracks.

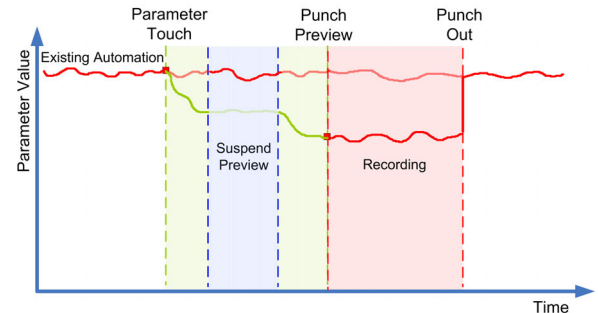
3. Play back the scene (you may want to loop it) and find the parameter setting(s) you want.



Touch the required parameter, start rolling, find the desired value and select Punch to start the new automation pass.

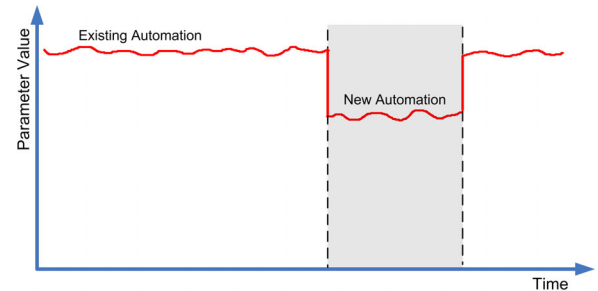
▪ If you want to compare the value found during preview with previously automated values, activate the Suspend option.

This plays back your audio material using the parameter values set before activating Preview. You can use the delta indicator in the automation track as an additional visual aid for comparing the values.



4. When you are happy with the values found, click the Punch button to start the new automation pass.

The new value setting is recorded, from the point where you punched in to your punch out position (as defined by the automation mode setting).



Punch vs. Punch on Play

When using the Punch option as described above, starting playback and punching in are two separate actions. If you want to punch in when starting playback, activate Punch on Play.

- Use Punch on Play when you cannot punch in on the fly – i.e. in situations where you need to find the punch in position in Stop mode. Once you have found the exact position, enable Punch on Play and start playback from there.
- Punch is the option to use if you need to listen to the section before your desired punch in point and if this section already contains automation data that you do not want to overwrite. Roll through this section and then punch in the automation pass.
- You can also use Punch in Stop mode. To create automation data in this way, Punch must be combined with one of the Fill modes (see “[The Fill options](#)” on [page 254](#)).

Auto Punch

As described in the section “[Automation modes](#)” on [page 248](#), when setting up a loop with the left and right locators, an automation pass will always punch out when reaching the right locator.

When in Preview mode, you can also use the left and right locators to automatically punch in and out at defined positions, using the Auto Punch command.

- Use Auto Punch when you want the automation pass to begin and end at defined positions.

You can also use Auto Punch without enabling Preview mode, to set up a “safe zone” for previously written automation data:

- Place the right locator at the beginning of an area you wish to protect and enable cycle mode.
This will ensure that a running automation pass will always punch out before reaching this section of your project.

Touch Assist

When you use Preview mode, you may get into a situation where you change some parameters, but not others, although they belong to the same group of parameters (e.g. EQ settings). To prevent you from forgetting some parameters while touch-collecting parameters for Preview (see also “[The Preview workflow](#)” on [page 257](#)), you can enable the Touch Assist option. You will find this option at the bottom of the Preview column on the Automation panel.

When Touch Assist is enabled, the parameters of the following features are treated as groups:

- Channel EQ module (21 parameters total)
- Aux send on/off and send level
- Stereo panner
- Surround panner (Left-Right, Front-Rear, LFE)
- Insert plug-ins (only available for plug-ins with 32 or less parameters)
- Touch Assist ensures that touching one parameter in a group will “touch” all other parameters in that group as well.
- However, if you want to automate only one particular parameter, disable Touch Assist to prevent yourself from inadvertently overwriting any previously created automation data.

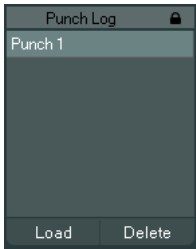


Enabling Touch Assist may lead to the creation of a large amount of automation data, causing a higher CPU load. Only use Touch Assist if the performance is still acceptable.

Changing VST presets in Preview mode

When changing a preset of a VST plug-in while in Preview mode, the change in the parameter settings caused by the preset change is recorded automatically as automation. Note that the plug-in must have 32 or less parameters for this to work.

The Punch Log section



This section of the Automation panel displays a list of recent punch in operations performed in Preview mode.

By loading one of these log entries for the current track, you recall the corresponding touch-collected parameters and their values at the moment of punch in.

- To load the settings of a particular entry in the punch log, select it in the list and click Load.

The Preview button on the Automation panel and the “Preview mode” button on the corresponding automation track light up to indicate that this parameter is now in Preview mode.

- You can rename any log entry by double-clicking it and entering a new name.
- To delete an entry, select it and click Delete.
- To specify how many log entries are displayed, use the “Max. Punch Logs” setting in the Automation Settings (Automation Settings section).

If this value is set to 10 entries, the eleventh punch event will overwrite the entry created for the first event, the twelfth will replace the second entry, etc. The maximum possible number of punch log entries is 100.

- You can prevent a particular entry from being overwritten by clicking in the right section for this entry, so that a checkmark is displayed.
- Punch log entries are saved with the current project. Punch log data is always project-specific. There is no way to export log entries to another project.

Loading behavior

When loading a log entry, you add the corresponding parameter(s) to any other parameters that you have touch-collected during the current Preview session.

However, if you manually touch-collect a parameter, e.g. volume, and then add volume again by loading a punch log entry, the settings for volume from the punch log will be used, replacing any values set manually.

The Suspend options

Suspend Read	Suspend Write
Volume	Volume
Pan	Pan
EQ	EQ
Sends	Sends
Inserts	Inserts
Mute	Mute
Others	Others
All	All

The parameters or parameter groups selected here are excluded from the reading or writing of automation data – giving you full manual control of these parameters.

⇒ The “Others” options refer to all parameters not covered by Volume, Pan, Mute, EQ, Sends, or Inserts.

Suspending Read

Imagine you have already automated several tracks. While working on the current track, you want one of the other tracks to be louder, to better identify a particular position in your audio material. By suspending Read for the Volume parameter, you regain full manual control and can set the volume to the required level.

- To suspend the reading of automation data for all parameters/parameter groups, click the All button at the bottom of the section.

When any of the options in the Suspend Read category are enabled, clicking All will disable these buttons.

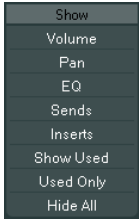
Suspending Write

Imagine the following situation: To help you concentrate while working on a particular track, you mute several other tracks. However, because write automations are active on these tracks, this mute state is also automated during the next automation pass – a classic situation in mixing.

To avoid inadvertently excluding whole tracks from your mix in this way, you can exclude Mute from all automation writing. Simply click Mute in the Suspend Write category on the Automation panel.

- To suspend the writing of automation data for all parameters/parameter groups, click the All button at the bottom of the Suspend Write category.
- When any of the options in the Suspend Write category are enabled, clicking All will disable these buttons.
- When an automation pass is in progress for a particular parameter and you write-suspend this parameter, it will punch out of the automation pass.

The Show options

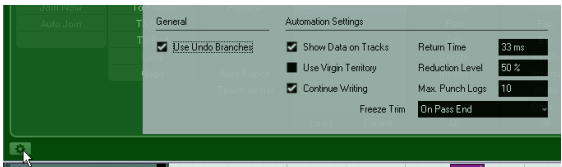


The Show options on the Automation panel always affect all tracks. Clicking these buttons opens the automation tracks for the corresponding parameters, e.g. Volume or Pan. This makes it easy to look at your EQ settings on several tracks, for example.

- When you click either Volume, Pan, EQ, Sends, or Inserts, this will open the corresponding automation track(s) for all tracks.
- The automation tracks will be opened even if no automation data was recorded on these tracks.
- For parameter groups (i.e. Pan, EQ, Sends, and Inserts) you can step through the individual parameter sets by repeatedly clicking the respective button.
 - When the Used Only button is enabled, clicking one of the options will show you only the corresponding automation tracks for which automation data has already been written.
 - When you click Show Used, all automation tracks that contain automation data will be displayed.
 - Hide All will hide all open automation tracks.

Automation Preferences

If you click the button in the bottom left of the Automation panel, you open the Automation Preferences. These are divided into General and Automation Settings.



The following options are available:

General

Option	Description
Use Undo Branches	Activate this to gather automation passes in branches, see “Working with Automation Passes” on page 252 .

Automation Settings

Option	Description
Show Data on Tracks	Activate this to show audio waveforms or MIDI events on automation tracks. The events are displayed only if the “Show waveforms” option is enabled in the Preferences dialog (Event Display–Audio) and if “Part Data Mode” (Event Display–MIDI) is set to an option other than “No data”.
Use Virgin Territory	Activate this if you want to use virgin territories, see “Virgin territory vs. the initial value” on page 245 .
Continue Writing	If you activate this option, the recording of automation will not be blocked when locating to a new position. For example, this can be used to perform multiple automation passes in Cycle mode or if you are using the arranger functions. If this option is deactivated and you write automation data and locate to another position in the project, the writing will be stopped until the mouse button is released or until a Stop command is received.
Return Time	This determines how fast the automated parameter returns to any previously automated value when you release the mouse button. Set this to a value higher than 0 to prevent sudden jumps in your parameter settings (which may lead to crackles).
Reduction Level	When punching out, this function will remove all superfluous automation events so that the automation curve contains only the events necessary to reproduce your actions.

Option	Description
Max Punch Logs	This specifies how many log entries are displayed. You can set values from 5 to 100, see also “The Punch Log section” on page 259 .
Freeze Trim	In this pop-up menu you can specify how to freeze your trim curve. Select “Manually” if you want to freeze your trim curve manually. Select “On Pass End” if you want a freeze to be performed whenever a write operation is finished. Select “On Leaving Trim Mode” if you want the trim data to freeze automatically when the trim mode is switched off (globally or individually for a track).

Hints and further options

Automation key commands

In the Key Commands dialog (opened from the File menu in Nuendo), in the Commands section on the left, you will find an Automation category which lists all automation commands to which you can assign key commands.

How to assign key commands is described in detail in the chapter [“Key commands”](#) on [page 580](#).

About linking and automation

- Nuendo allows you to link, in the Mixer window, various parameters between different channels (see [“Link/Unlink channels”](#) on [page 175](#)).

When automating the settings of a channel that is linked to another channel in the Mixer, the parameters of the linked channel will NOT be automated.

- Also, in the Channel Settings window, you can make the send’s panorama settings follow the panorama settings displayed in the channel strip (by enabling the “Send Routing Panners follow Channel Panner” option in the Control Strip section, see [“Setting pan for the sends”](#) on [page 206](#)).

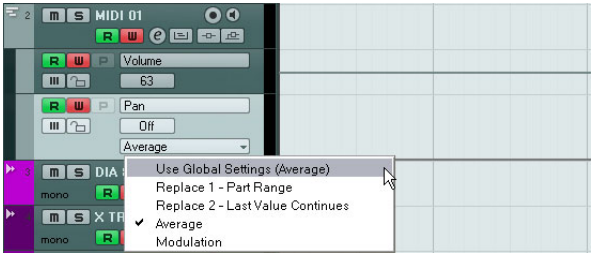
For linked panners of sends and channels, automating the channel panner will automate the send routing panner as well.

MIDI controller automation

Merging automation data

When working with Nuendo, it is possible to record automation data for MIDI controllers in two places: as MIDI part data and as data on an automation track.

If you have such “conflicting” automation data, you can specify separately for every parameter how these will be combined during playback. This is done by selecting an Automation Merge Mode in the track list for the automation track.



The following options are available:

Option	Description
Use Global Settings	When this is selected, the automation track uses the “global” Automation Merge Mode specified in the MIDI Controller Automation Setup dialog, see below.
Replace 1 - Part Range	When this is selected, the part data has playback priority over the automation track data, i.e. at the left and right part borders, the automation mode switches abruptly from part to track automation, and vice versa.
Replace 2 - Last Value Continues	Similar to the above, but part automation only begins when the first controller event within the part is reached. At the end of the part, the last controller value will be kept until an automation event is reached on the automation track.
Average	When this is selected, the average values between part and track automation will be used.
Modulation	In this mode, the automation track curve modulates the existing part automation, with higher curve points emphasizing the automation values and lower curve points reducing the automation values even further.

⇒ This pop-up menu is only available for controllers that can be recorded both for a part and a track. When the pop-up menu is not available in the track list, the current parameter will not cause any playback conflicts.

For a full list of all the parameters with potential automation data conflicts, open the MIDI Controller Automation Setup dialog, see below.

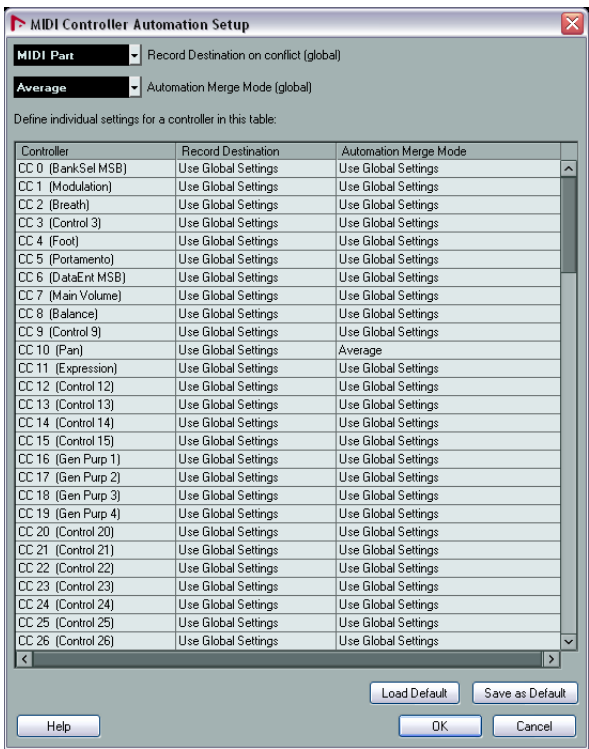
The settings you make for a controller are applied to all MIDI tracks that use this controller.

MIDI Controller Automation Setup settings

In the MIDI Controller Automation Setup dialog, you can specify how existing MIDI automation is handled on playback and where new automation data is recorded, in a MIDI part or as track automation.

Proceed as follows:

1. On the MIDI menu, select “CC Automation Setup...”. A dialog opens.



2. On the “Record Destination on conflict (global)” pop-up menu, specify the record destination for MIDI controller data.

This determines which destination will be used if there is a “conflict”, i.e if MIDI controller data is received by Nuendo and both the Record and the Automation Write buttons are enabled.

The following options are available:

Option	Description
MIDI Part	Select this to record MIDI part automation.
Automation Track	Select this to record the controller data on an automation track in the Project window.

3. On the “Automation Merge Mode (global)” pop-up menu, specify the global Automation Merge Mode, i.e. the mode that will be used for all automation tracks with the “Use Global Settings” setting, see above.

- In the table in the lower section of the dialog, you can specify the record destination and the Automation Merge Mode separately for all the available MIDI controllers. This gives you full control over the MIDI automation (destination as well as merge mode) in your project.

4. Click in the Record Destination column for a MIDI controller to open the pop-up menu where you can choose where you want recorded data of this particular MIDI Controller to end up.

5. Click in the Automation Merge Mode column for a MIDI controller to specify what will happen with data for this specific controller on playback.

All settings you make in this dialog are saved with the project.

- When you create a new project, the default settings will be used. To save the current settings as default settings, click the “Save as Default” button. To return to the default settings, click the Load Default button.

Background

Audio processing in Nuendo can be called “non-destructive”, in the sense that you can always undo changes or revert to the original versions. This is possible because processing affects audio clips rather than the actual audio files, and because audio clips can refer to more than one audio file. This is how it works:

1. If you process an event or a selection range, a new audio file is created in the Edits folder, within your project folder.

This new file contains the processed audio, while the original file is unaffected.

2. The processed section of the audio clip (the section corresponding to the event or selection range) then refers to the new, processed audio file.

The other sections of the clip will still refer to the original file.

- Since all edits are available as separate files, it is possible to undo any processing, at any point and in any order! This is done in the Offline Process History dialog, see “[The Offline Process History dialog](#)” on [page 275](#).

- Furthermore, the original, unprocessed audio file can still be used by other clips in the project, by other projects or by other applications.

Audio processing

Basically, you apply processing by making a selection and selecting a function from the Process submenu of the Audio menu. Processing is applied according to the following rules:

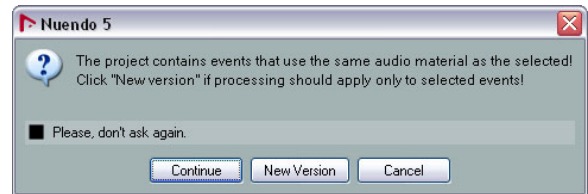
- When events are selected in the Project window or the Audio Part Editor, the processing will be applied to these events only.

Processing will only affect the clip sections that are referenced by the events.

- When an audio clip is selected in the Pool, the processing will be applied to the whole clip.

- When you have made a selection range, the processing will be applied to this range only. Other sections of the clip are not affected.

If you attempt to process an event that is a shared copy (i.e. the event refers to a clip that is used by other events in the project), you are asked whether you want to create a new version of the clip or not.



Select “New Version” if you want the processing to affect the selected event only. Select “Continue” if you want the processing to affect all shared copies.

⇒ If you activate “Please, don't ask again”, any further processing you do will conform to the selected method (“Continue” or “New Version”). You can change this setting at any time by using the “On Processing Shared Clips” pop-up menu in the Preferences dialog (Editing–Audio page). Also, “Create New Version” will now be displayed as an option in the dialog for the processing function.

Common settings and features

If there are any settings for the selected Audio processing function, these will appear when you select the function from the Process submenu. While most settings are specific for the function, some features and settings work in the same way for several functions.

The “More...” button

If the dialog has a lot of settings, some options may be hidden when the dialog opens. To reveal these, click the “More...” button.



To hide the settings, click the button again (now labeled “Less...”).

The Preview, Process, and Cancel buttons

These buttons have the following functionality:

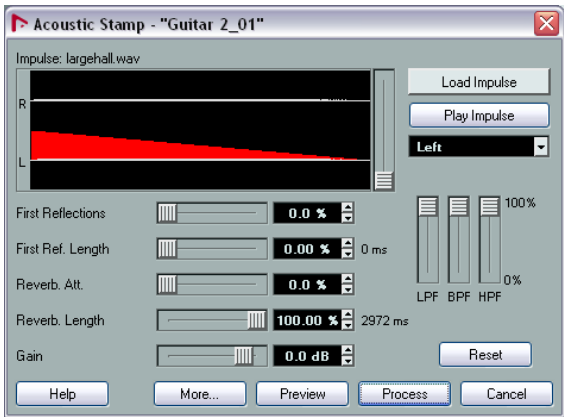
Button	Description
Preview	Allows you to listen to the result of the processing with the current settings. Playback will continue repeatedly until you click the button again (the button is labeled "Stop" during Preview playback). You can make adjustments during Preview playback, but the changes are not applied until the start of the next "lap". Some changes may automatically restart the Preview playback from the beginning.
Process	Performs the processing and closes the dialog.
Cancel	Closes the dialog without processing.

Pre/Post-Crossfade

Some processing functions allow you to gradually mix the effect in or out. This is done with the Pre/Post-Crossfade parameters. For example, if you activate Pre-Crossfade and specify a value of 1000ms, the processing is applied gradually from the start of selection, reaching full effect 1000ms after the start. Similarly, if you activate Post-Crossfade, the processing is gradually removed, starting at the specified interval before the end of the selection.

⚠ The sum of the Pre-Crossfade and Post-Crossfade times cannot be larger than the length of the selection.

Acoustic Stamp



The Acoustic Stamp function is a convolution tool, which allows you to apply room characteristics (reverb) to the audio. This is done by processing the audio signal according to an impulse response – generally a stereo or mono recording of a very short signal (the impulse) in a room or other location. As a result, the processed audio will sound as if it were played in the same location.

⚠ This function requires a lot of processing power, especially when using the Preview function. If you are working with long impulse response files or stereo files, you may find that Preview playback stutters or stops. In that case, it is better to process the material, listen to the result and modify it in the Offline Process History (see ["The Offline Process History dialog"](#) on [page 275](#)) if necessary.

The dialog contains the following settings:

Impulse and Envelope display

This display shows the loaded impulse response (in white) and the Envelope (in red). You can zoom in vertically on the impulse response using the slider to the right of the display (this can be useful since impulse responses typically are very weak). Zooming does not affect the processing in any way.

Load Impulse button

Clicking the "Load Impulse" button allows you to load an impulse response file from disk. These are ordinary WAV or AIFF audio files, with a maximum duration of 12 seconds. The name of the currently loaded impulse response file is shown above the display.

- A number of demonstration impulse response files are included in the Nuendo program folder.
- For proper use of the Acoustic Stamp function, we recommend that you acquire files from a professional impulse response library.

Play Impulse button

Plays back the currently loaded impulse response.

Channel selector

If the currently loaded impulse response is a stereo file, this pop-up menu allows you to select whether the left channel, right channel or both (stereo) are used for the convolution process.

Envelope controls

The five sliders below the display are used for setting up the “reverb envelope”, that is, a gain curve modifying how the impulse response is applied over time, and thereby the reverb character. These settings are reflected in the red Envelope display above. The sliders have the following functionality:

Parameter	Description
First Reflec-tions	A level control for the first section of the reverb (the length of which is set with the next parameter, see below). Usually, this governs the volume of the first reflection(s) of the reverb.
First Ref. Length	This determines the length of the First Reflections section (the level of which is controlled by the previous parameter). Set this so that it includes the first reflection in the impulse response (normally about 5% of the total length).
Reverb Att.	A level control for the end section of the reverb (the section after the First Reflections, see above).
Reverb Length	Governs the reverb time, in milliseconds.
Gain	Allows you to adjust the gain of the impulse response. This may be necessary for optimal results, since different impulse response files may be recorded at different levels.

Filter controls

The three sliders to the right allow you to tailor the tonal character of the processed sound. In essence, this is a graphic equalizer with three broad bands: the LPF slider governs the low frequency content, the BPF governs the midrange and the HPF governs the high frequency content.

- Setting a slider to 100% means that the corresponding filter is “fully open”.

When all three sliders are set to 100%, the processed audio is not filtered at all.

Reset button

Sets all parameters in the upper section of the dialog to their default values.

Wet/Dry Mix

These two sliders allow you to specify the balance between wet (processed) and dry (original) signal in the resulting clip.

Normally the two sliders are “reverse-ganged”, so that raising the Wet mix slider lowers the Dry mix slider by the same amount. However, if you press [Alt]/[Option] and drag a slider, you can move it independently. This allows you to set 80% dry and 80% wet signal, for example. Be careful to avoid distortion.

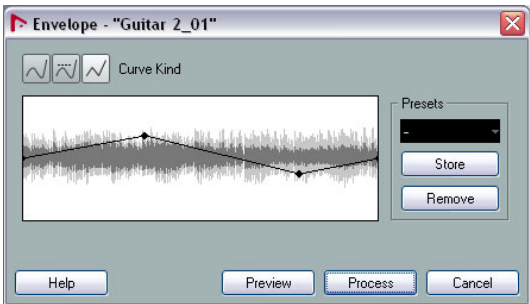
Tail

This parameter allows you to “add space” after the original audio section, to avoid that the reverb tail is cut off. When the checkbox is activated, you can specify a tail length using the slider. The tail time is included when playing back with the Preview function, allowing you to find the appropriate tail length. A good value would be the Reverb Length value, displayed in ms to the right of the Reverb Length parameter.

Pre and Post-Crossfade

See “Pre/Post-Crossfade” on [page 265](#).

Envelope



The Envelope function allows you to apply a volume envelope to the selected audio. The dialog contains the following settings:

Curve Kind buttons

These determine whether the envelope curve consists of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).

Envelope display

Shows the shape of the envelope curve. The resulting waveform shape is shown in dark gray, with the current waveform shape in light gray. You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Presets

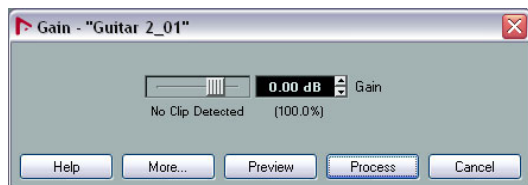
If you have set up an envelope curve that you may want to apply to other events or clips, you can store it as a preset by clicking the Store button.

- To apply a stored preset, select it from the pop-up menu.
- To rename the selected preset, double-click on the name and enter a new one in the dialog that opens.
- To remove a stored preset, select it from the pop-up menu and click Remove.

Fade In and Fade Out

For a description of these functions, see the chapter [“Fades, crossfades and envelopes”](#) on [page 112](#).

Gain



Allows you to change the gain (level) of the selected audio. The dialog contains the following settings:

Gain

This is where you set the desired gain, between -50 and +20dB. The setting is also indicated below the Gain display as a percentage.

Clipping detection text

If you use the Preview function before applying the processing, the text below the slider indicates whether the current settings result in clipping (audio levels above 0dB). If that is the case, lower the Gain value and use the Preview function again.

- If you want to increase the level of the audio as much as possible without causing clipping, use the Normalize function instead (see [“Normalize”](#) on [page 268](#)).

Pre-Crossfade and Post-Crossfade

See [“Pre/Post-Crossfade”](#) on [page 265](#).

Merge Clipboard



This function mixes the audio from the clipboard into the audio selected for processing, starting at the beginning of the selection.

- ⚠ For this function to be available, you need to have cut or copied a range of audio in the Sample Editor first.

The dialog contains the following settings:

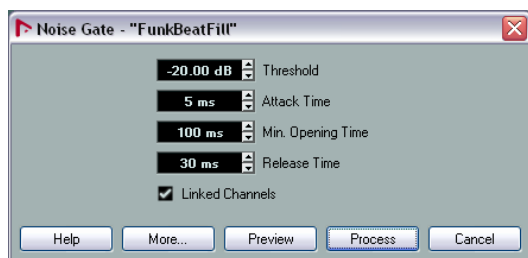
Sources mix

Allows you to specify a mix ratio between the original (the audio selected for processing) and the copy (the audio on the clipboard).

Pre-Crossfade and Post-Crossfade

See [“Pre/Post-Crossfade”](#) on [page 265](#).

Noise Gate



Scans the audio for sections weaker than a specified threshold level and replaces them with silence. The dialog contains the following settings:

Threshold

The level below which you want audio to be silenced. Levels below this value will close the gate.

Attack Time

The time it takes for the gate to open fully after the audio level has exceeded the threshold level.

Min. Opening Time

This is the shortest time the gate will remain open. If you find that the gate opens and closes too often when processing material that varies rapidly in level, try raising this value.

Release Time

The time it takes for the gate to close fully after the audio level has dropped below the threshold level.

Linked Channels

This is available for stereo audio only. When it is activated, the Noise Gate is opened for both channels as soon as one or both channels exceed the Threshold level. When Linked Channels is deactivated, the Noise Gate works independently for the left and right channel.

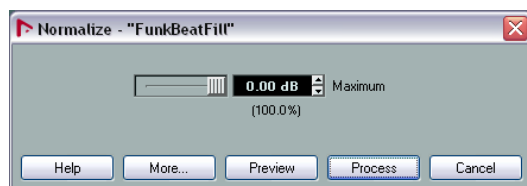
Dry/Wet mix

Allows you to specify a mix ratio between “dry” and processed sound.

Pre-Crossfade and Post-Crossfade

See [“Pre/Post-Crossfade” on page 265](#).

Normalize



The Normalize function allows you to specify the desired maximum level of the audio. It then analyzes the selected audio and finds the current maximum level. Finally it subtracts the current maximum level from the specified level and raises the gain of the audio by the resulting amount (if the specified maximum level is lower than the current maximum, the gain will be lowered instead). A common use for Normalizing is to raise the level of audio that was recorded at too low an input level. The dialog contains the following settings:

Maximum

The desired maximum level for the audio, between -50 and 0dB. The setting is also indicated below the Gain display as a percentage.

Pre-Crossfade and Post-Crossfade

See [“Pre/Post-Crossfade” on page 265](#).

Phase Reverse

Reverses the phase of the selected audio, turning the waveform “upside down”.

The dialog contains the following settings:

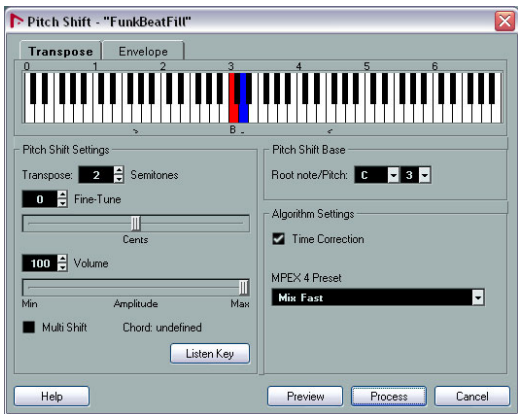
Phase Reverse on

When processing stereo audio, this pop-up menu allows you to specify which channel(s) are phase-reversed.

Pre-Crossfade and Post-Crossfade

See [“Pre/Post-Crossfade” on page 265](#).

Pitch Shift



This function allows you to change the pitch of the audio with or without affecting its length. You can also create “harmonies” by specifying several pitches or apply pitch shift based on a user specified envelope curve.

When the Transpose tab is selected, the dialog contains the following parameters:

Keyboard display

This is a graphic overview of the transposition setting. Here, you can specify the transpose interval in semitones.

- The root note is indicated in red.
- This has nothing to do with the actual key or pitch of the original audio, it just provides a way to display transpose intervals. You can change the root note by using the settings in the Pitch Shift Base section, or by pressing [Alt]/[Option] and clicking in the keyboard display.
- To specify a transpose interval, click on one of the keys. The key is indicated in blue, and the program plays test tones in the base pitch and transpose pitch to give you an audible confirmation.
 - If “Multi Shift” is activated (see below), you can click on several keys to create “chords”. Clicking on a blue (activated) key removes it.

Pitch Shift settings

The “Semitones” and “Fine tune” settings allow you to specify the amount of pitch shift. You can transpose the audio ± 16 semitones, and fine tune it by ± 200 cents (hundredths of semitones).

Volume/Amplitude

Allows you to lower the volume of the pitch-shifted sound.

Multi Shift

When this is activated, you can add several transpose values, creating multi-part harmonies. This is done by adding intervals in the keyboard display (see above). Note that you cannot use the Preview function in Multi Shift mode.

- If the intervals you add make up a standard chord, this chord is displayed to the right.
- Note, however, that to include the base pitch (the original, untransposed sound) in the processed result, you need to click the base key in the keyboard display as well, so that it is displayed in blue.

Listen Key/Chord button

Clicking this button plays a test tone pitched according to the activated interval key on the keyboard display. If “Multi Shift” is activated, this button is called “Listen Chord” and plays all activated intervals as a chord.

Pitch Shift Base

This allows you to set the root note (the red key in the keyboard display). It has nothing to do with the actual pitch, but is an aid for setting up intervals and chords.

Pitch Shift Mode

This is where you can make settings for the MPEX 4 algorithm. You can choose between 7 quality settings:

Option	Description
Preview	This mode should only be used for preview.
Mix Fast	This mode is a very fast mode for preview. This works best with composite music signals mono or stereo material.
Solo Fast	Use this mode for single instruments (monophonic material) and voice.
Solo Musical	Same as above but higher quality.
Poly Fast	Use this for processing monophonic and polyphonic material. This is the fastest setting that gives still very good results. You can use this for drum loops, mixes, chords.
Poly Musical	Use this for processing monophonic and polyphonic material. This is the recommended MPEX default quality setting. You can use this for drum loops, mixes, chords.
Poly Complex	This high quality setting is quite CPU-intensive and should be used only when processing difficult material or for stretch factors above 1.3.

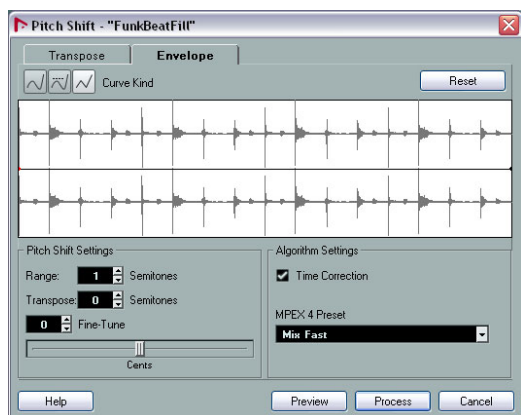
Formant Mode

If you are processing vocal material, activate this option in order to preserve the vocal characteristics of the pitch-shifted audio and to avoid a “chipmunk voice” effect.

Time Correction

When this is activated, the pitch shift process will not affect the length of the audio. When this is deactivated, raising the pitch will shorten the audio section and vice versa, much like changing the playback speed on a tape recorder.

Using envelope based Pitch Shift



When the “Envelope” tab is selected, you can specify an envelope curve on which the pitch shift will be based. This allows you to create pitchbend effects, pitch-shift different sections of the audio by different amounts, etc.

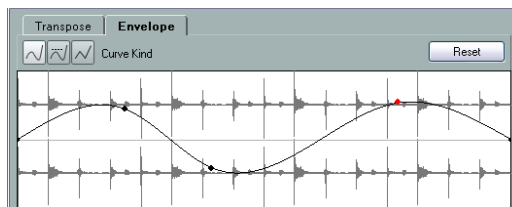
Envelope display

Shows the shape of the envelope curve over the waveform image of the audio selected for processing. Envelope curve points above the center line indicate positive pitch shift, while curve points below the center line indicate negative pitch shift. Initially, the envelope curve will be a horizontal, centered line, indicating zero pitch shift.

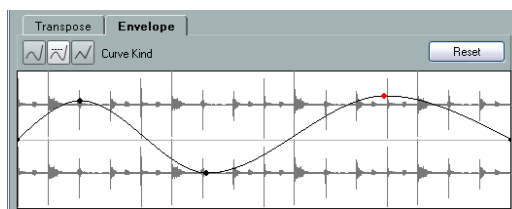
- You can click on the curve to add points, and click and drag existing points to change the shape. To remove a point from the curve, drag it outside the display.

Curve Kind

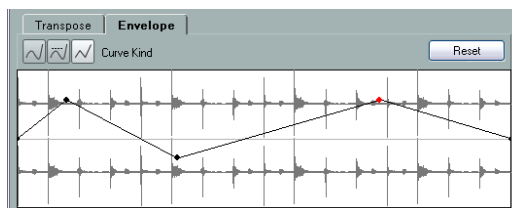
These buttons determine whether the envelope curve consists of spline curve segments (left button), damped spline segments (middle button) or linear segments (right button).



Spline curve segment envelope



The same envelope with damped spline segments selected



The same envelope with linear segments selected

Range

This parameter determines the vertical pitch range of the envelope. If set to “4”, moving a curve point to the top of the display corresponds to pitch shifting by +4 semitones. The maximum range is +/-16 semitones.

Transpose and Fine Tune

These parameters allow you to adjust the value of a curve point numerically:

1. Click on a curve point to select it.
The selected point is shown in red.
2. Adjust the Transpose and Fine Tune parameters to change the pitch of the curve point in semitones and cents, respectively.

Pitch Shift Mode

These are the same parameters as on the Transpose tab, see [“Pitch Shift Mode”](#) on [page 269](#).

Example

Let's say that you wish to create a pitchbend effect, so that the pitch is raised linearly by exactly 2 semitones in a specific part of the selected audio.

1. Remove all curve points by clicking the Reset button.
2. Select a linear curve by clicking the Curve Kind button to the right.
3. Make sure that the Range parameter is set to 2 semitones or higher.

4. Create a point where you want the pitchbend to start by clicking on the envelope line.

Since this is the starting point for the pitchbend, you want its pitch to be zero (the envelope line should still be straight). If necessary, use the Fine Tune parameter to set the curve point to 0 cents, because this point governs the start point, where you want the pitch transition to begin.

5. Create a new curve point at the horizontal position where you want the pitchbend to reach the full value. This curve point determines the rise time of the pitchbend effect, i.e. the further away from the starting point the new point is positioned, the longer it will take for the pitchbend to reach the full value, and vice versa.

6. With the second point still selected, use the Transpose and Fine Tune parameters to set the pitch to exactly 2 semitones.

7. Create a new curve point to set the duration of the pitchbend, i.e. the time the pitch will remain transposed by 2 semitones.

8. Finally, create a point where you want the pitchbend to end.

You do not have to create a new point if you are at the end of the audio file, since there is always an end point at the right side of the waveform display.

9. If necessary, make additional settings in the Pitch Shift Mode section, see [“Pitch Shift Mode”](#) on [page 269](#).

10. Click Process.

The pitchbend is applied according to the specified settings.

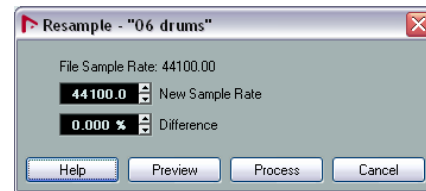
Remove DC Offset

This function will remove any DC offset in the audio selection. A DC offset is when there is too large a DC (direct current) component in the signal, sometimes visible as the signal not being visually centered around the “zero level axis”. DC offsets do not affect what you actually hear, but they affect zero crossing detection and certain processing, and it is recommended that you remove them.

⚠ It is recommended that this function is applied to complete audio clips, since the DC offset (if any) is normally present throughout the entire recording.

There are no parameters for this function. Note that you can check for DC Offset in an audio clip using the Statistics function (see [“Statistics”](#) on [page 281](#)).

Resample



The Resample function can be used for changing the length, tempo and pitch of an event.

The original sample rate of the event is listed in the dialog. Resample the event to a higher or lower sample rate by either specifying a sample rate or by specifying the difference (as a percentage value) between the original sample rate and the desired new one.

- Resampling to a higher sample rate will make the event longer and cause the audio to play back at a slower speed with a lower pitch.
- Resampling to a lower sample rate will make the event shorter and cause the audio to play back at a faster speed with a higher pitch.
- You can audition the result of the resampling by entering the desired value and clicking “Preview”. The event will then be played back as it will sound after the resampling.
- When you are satisfied with the preview result, click “Process” to close the dialog and apply the processing.

Reverse

Reverses the audio selection, as when playing a tape backwards. There are no parameters for this function.

Silence

Replaces the selection with silence. There are no parameters for this function.

Stereo Flip



This function works with stereo audio selections only. It allows you to manipulate the left and right channel in various ways.

The dialog contains the following parameters:

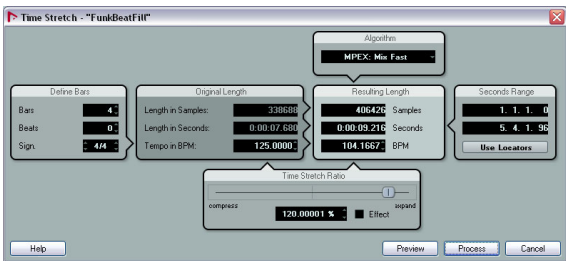
Mode



This pop-up menu determines what the function does:

Option	Description
Flip Left-Right	Swaps the left and right channel.
Left to Stereo	Copies the left channel sound to the right channel.
Right to Stereo	Copies the right channel sound to the left channel.
Merge	Merges both channels on each side for mono sound.
Subtract	Subtracts the left channel information from the right. This is typically used as a "Karaoke effect", for removing centered mono material from a stereo signal.

Time Stretch



This function allows you to change the length and “tempo” of the selected audio without affecting the pitch. The dialog contains the following parameters:

Define Bars section

In this section, you set the length of the selected audio and the time signature:

Option	Description
Bars	If you use the tempo setting (see below), specify the length of the selected audio here, in bars.
Beats	If you use the tempo setting, specify the length of the selected audio here, in beats.
Sign.	If you use the tempo setting, specify the time signature here.

Original Length section

This section contains information and settings regarding the audio selected for processing:

Option	Description
Length in Samples	The length of the selected audio, in samples.
Length in Seconds	The length of the selected audio, in seconds.
Tempo in BPM	If you are processing music, and know the actual tempo of the audio, you can enter it here as beats per minute. This makes it possible to time-stretch the audio to another tempo, without having to compute the actual time stretch amount.

Resulting Length section

These settings are used if you want to stretch the audio to fit within a specific time span or tempo. The values will change automatically if you adjust the Time Stretch Ratio (see below).

Option	Description
Samples	The desired length in samples.
Seconds	The desired length in seconds.
BPM	The desired tempo (beats per minute). For this to work, you have to know the actual tempo of the audio, and specify this (along with time signature and length in bars) in the Original Length section to the left.

Seconds Range section

These settings allow you to set the desired range for the time stretch.

Option	Description
Range	Allows you to specify the desired length as a range between two time positions.
Use Locators	Clicking the diamond-shaped button below the Range fields sets the Range values to the left and right Locator positions, respectively.

Time Stretch Ratio section

The Time Stretch Ratio determines the amount of time stretch as a percentage of the original length. If you use the settings in the Resulting Length section to specify the amount of time stretch, this value will change automatically. The possible range depends on the “Effect” option:

- If the “Effect” checkbox is deactivated, the range is 75–125%.

This is the preferred mode if you want to preserve the character of the sound.

- If the “Effect” checkbox is activated, you can specify values between 10 and 1000% (Realtime), or 50 and 200% (MPEX 4).

This mode is mainly useful for special effects, etc.

Algorithm section

In this section you can select a time stretch algorithm. The pop-up menu contains various presets based on the MPEX 4 and Realtime algorithms.

- **MPEX 4 mode**

This mode is based on Prosoniq’s proprietary MPEX (Minimum Perceived Loss Time Compression/Expansion) algorithm. This algorithm (which is also used in Prosoniq’s TimeFactory™ application) uses an artificial neural network for time series prediction in the scale space domain to achieve high end time and pitch scaling. This gives the best possible audio quality result. You can choose between 7 quality settings, see “Pitch Shift Mode” on page 269.

- **Realtime mode**

This is the algorithm used for the realtime time stretching features in Nuendo. Although this algorithm is optimized for time stretching in realtime, you can use it for offline processing as well. The Presets pop-up contains the same presets as found in the Algorithm pop-up menu in the Sample Editor, see “Selecting an algorithm for realtime playback” on page 296.

Applying plug-ins

You can add plug-in effects in realtime during playback (see the chapter “Audio effects” on page 195). However, sometimes it is useful to “permanently” apply effects to one or several selected events. This is done in the following way:

1. Make a selection in the Project window, the Pool or an editor.
Effects are applied according to the same rules as Processing (see “Common settings and features” on page 264).
2. Select “Plug-ins” from the Audio menu.
3. Select the desired effect from the submenu.
The Process Plug-in dialog opens.

About stereo and mono

If you are applying an effect to mono audio material, only the left side of the effect’s stereo output will be applied.

The process plug-in dialog



The process plug-in dialog for the StudioChorus effect

The upper section of the process plug-in dialog contains the effect parameters of the selected plug-in. For details on the parameters of the included plug-ins, see the separate PDF document “Plug-in Reference”.

The lower section of the dialog contains settings for the actual processing. These are common to all plug-ins.

- If the lower section is hidden, click the “More...” button to display it.

Clicking the button again (now labeled “Less...”) will hide the lower section.

The following settings and functions are available in the common, lower section of the dialog:

Wet mix/Dry mix

These two sliders allow you to specify the balance between wet (processed) and dry (original) signal in the resulting clip.

Normally the two sliders are “reverse-ganged”, so that raising the Wet mix slider lowers the Dry mix slider by the same amount. However, if you press [Alt]/[Option] and drag a slider, you can move it independently. This allows you to set 80% dry and 80% wet signal, for example. Be careful to avoid distortion.

Tail

This parameter is useful if you are applying an effect that adds material after the end of original audio (such as reverb and delay effects). When the checkbox is activated, you can specify a tail length using the slider. The tail time is included when playing back with the Preview function, allowing you to find the appropriate tail length.

Pre/Post-Crossfade

These settings allow you to gradually mix the effect in or out. For example, if you activate Pre-Crossfade and specify a value of 1000ms, the effect is applied gradually from the start of selection, reaching full effect 1000ms after the start. Similarly, if you activate Post-Crossfade, the processing is gradually removed, starting at the specified interval before the end of the selection.

⚠ The sum of the Pre-Crossfade and Post-Crossfade times cannot be larger than the length of the selection.

Preview button

Allows you to listen to the result of the processing with the current settings. Playback will continue repeatedly until you click the button again (the button is labeled “Stop” during Preview playback). You can change the effect settings during Preview playback if needed.

Process button

Applies the effect and closes the dialog.

Cancel button

Closes the dialog without applying the effect.

The Offline Process History dialog

If you want to remove or modify some or all processing from a clip, this can be done in the Offline Process History dialog. Processing that can be modified in the Offline Process History dialog includes the functions on the Process menu, any applied plug-in effects, and Sample Editor operations such as Cut, Paste, Delete and drawing with the Pencil tool.

⇒ Due to the clip-file relationship (see [“Background”](#) on [page 264](#)), it is even possible to modify or remove some processing “in the middle” of the Process History, while keeping later processing! This feature depends on the type of processing performed (see [“Restrictions”](#) on [page 275](#)).

Proceed as follows:

1. Select the clip in the Pool or one of its events in the Project window.

You can see which clips have been processed by checking the Status column in the Pool – the waveform symbol indicates that processing or effects have been applied to the clip (see [“About the Status column symbols”](#) on [page 322](#)).

2. Select “Offline Process History...” from the Audio menu.

The Offline Process History dialog opens.



The left part of the dialog contains a list of all processing you have added to the clip, with the most recent operations at the bottom of the list. The “Start” and “Length” columns indicate which section of the clip was affected by each operation. The “Status” column indicates if the operation can be modified or undone.

3. Locate the operation you want to edit and select it by clicking on it in the list.

- To modify the settings of the selected processing, click the “Modify” button.

This opens the dialog for the processing function or applied effect, allowing you to change the settings. This works just as when you applied the processing or effect the first time.

- To replace the selected operation with another processing function or effect, select the desired function from the pop-up menu and click the “Replace By” button.

If the selected function has settings, a dialog will appear as usual. The original operation will then be removed and the new processing will be inserted in the Offline Process History.

- To remove the selected operation, click the “Remove” button.

The processing is removed from the clip.

- To undo the selected operation and remove the processing from the clip click the “Deactivate” button.

The processing is removed from the clip, but the operation remains in the list. To redo the operation and apply the processing again, click the button, now renamed to “Activate”, again.

- To save the list of processing operations as a Batch Process, click the “Save As Batch” button.

See [“Batch Processing”](#) on [page 276](#).

4. Click “Close” to close the dialog.

Restrictions

- If there are no settings for the processing function, you cannot modify it.

- If you have applied processing that changes the length of the clip (such as Cut, Insert or Time Stretch), you can only remove this if it is the most recent processing in the Offline Process History (at the bottom of the list in the dialog). If an operation cannot be removed or modified, this is indicated by an icon in the “Status” column. Also, the corresponding buttons will be grayed out.

- The list must contain at least two processing operations in order to be saved as a Batch Process (see [“Batch Processing”](#) on [page 276](#)).

Batch Processing

Nuendo features a Batch Processing function that lets you apply a chain of audio processing to one or several events in one go – in either the Project window or the Pool. Batch Processing is based on operations in the Offline Process History dialog, described above. That is, the list of applied processes in this dialog is what can be made to constitute a batch process.

Batch Processing is therefore a convenient way to apply the same effects with the same settings to several audio events in a project.

It can also be used to “store” effect settings for future use. You may for example have performed a series of elaborate audio processing with a good result, and want to retain the particular combination and settings of effects you applied, so that you may quickly and easily apply them again to other events in the future.

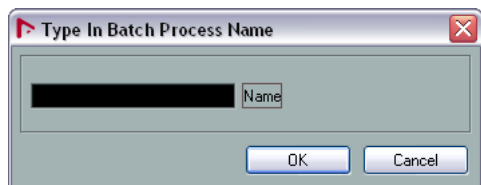
To set up a batch process, proceed as follows:

1. Apply the desired processing to an audio event or selection range in the project.

Note that you must apply at least two audio processes to be able to set up a batch process.

From here, there are two ways to go:

- Pull down the Audio menu, and from the Batch Processes submenu, select “Create from Process History...”, type in a name for the batch process in the dialog that opens, and click OK.



or...

- Pull down the Audio menu and select “Offline Process History”.

The Offline Process History dialog opens. In this dialog you can modify settings or remove operations as desired (see [“The Offline Process History dialog”](#) on page 275).

2. In the Process History Dialog, click “Save As Batch”, and then type in a name for the batch process in the dialog that opens and click OK.

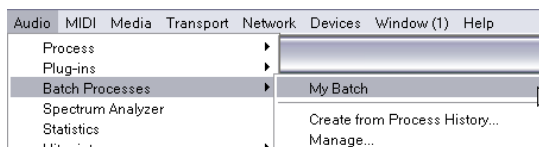
Regardless of which of the above two methods you use, the batch process is now saved and available for use:

3. In the Project window, select all the audio events you want to process.

You can also make a selection range that spans multiple tracks and batch process the selection for all the audio events.

4. Pull down the Audio menu and open the Batch Processes submenu.

At the top of the menu you can now find the name of the batch process you created. The menu will list the names of any batch processes you create, until you delete them (see below).



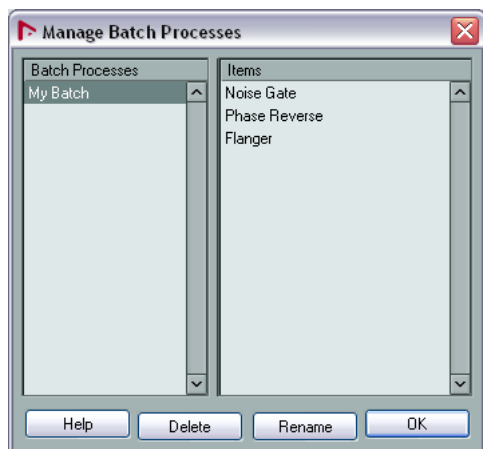
5. Select the batch process you want to apply from the menu.

All the selected events will now be processed accordingly.

⇒ Note that even if you clear the Offline Process History dialog of all the operations that make up a batch process, this will not affect the saved batch process. It will still contain and perform the operations on which it was based when created.

Managing Batch Processes

You can delete and rename created batch processes in the Manage Batch Processes dialog.



- Open the Audio menu and select “Manage...” from the Batch Processes submenu to open the Manage Batch Processes dialog.

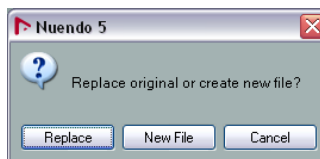
The created batch processes are listed in the left column, and the operations each batch process contains are listed in the right column.

- To remove a batch process, just select it in the list and click “Delete”.
- To change the name of a batch process, select it in the list and click “Rename” and enter the new name.

Freeze Edits

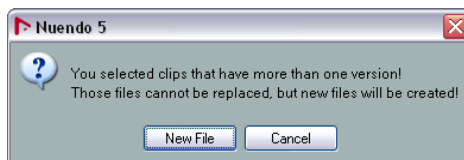
The Freeze Edits function on the Audio menu allows you to make all processing and applied effects permanent for a clip:

1. Select the clip in the Pool or one of its events in the Project window.
2. Select “Freeze Edits...” from the Audio menu.
 - If there is only one edit version of the clip (no other clips refer to the same audio file), the following dialog will appear:



If you select “Replace”, all edits will be applied to the original audio file (the one listed in the clip’s Path column in the Pool). If you select “New File”, the Freeze Edits operation will create a new file in the Audio folder within the project folder (leaving the original audio file unaffected).

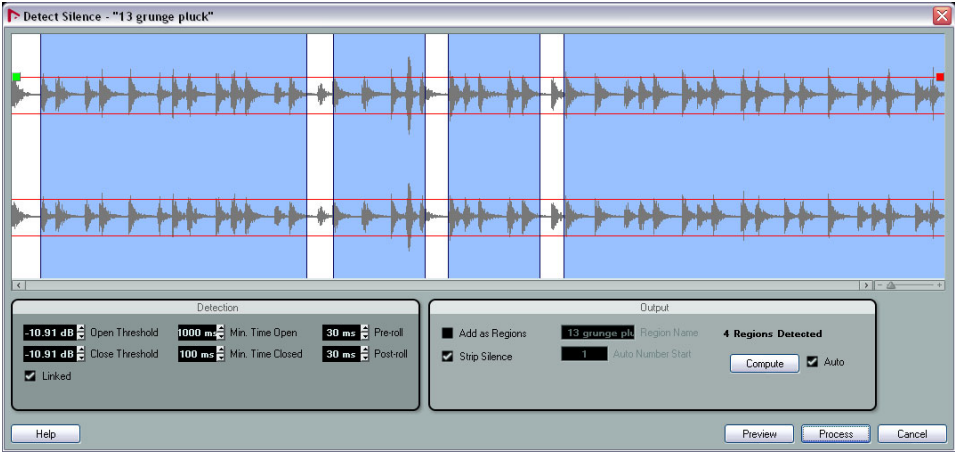
- If the selected clip (or the clip played by the selected event) has several edit versions (i.e. there are other clips referring to the same audio file), the following alert will appear:



As you can see, you do not have the option to Replace the original audio file in this case. This is because that audio file is used by other clips. Select “New File” to have a new file created in the Audio folder within the project folder.

- ⚠ After a Freeze Edits, the clip refers to a new, single audio file. If you open the Offline Process History dialog for the clip, the list will be empty.

Detect Silence



The Detect Silence function searches for silent sections in an event and either splits the event, removing the silent parts from the project, or creates regions corresponding to the non-silent sections.

- To open the Detect Silence dialog, select one or several audio events in the Project window or the Audio Part Editor. On the Audio menu, open the Advanced submenu and select “Detect Silence”.

If you select more than one event, the Detect Silence dialog allows you to process the selected events successively with individual settings or to apply the same settings to all selected events at once.

Adjustments in the waveform display

The upper part of the dialog displays a waveform image of the selected audio event. In case you have selected several audio events, the waveform of the event that you have selected first is shown. You can make the following adjustments:

- With the zoom slider below the waveform to the right, zoom in and out on the waveform. You can also click in the waveform, keep the mouse button pressed, and move the mouse for zooming. Move the mouse down to zoom in and move it up to zoom out.
- If you have zoomed in on the waveform, it may not be completely visible anymore. In this case, the scroll bar to the left of the zoom slider allows you to scroll through the waveform. You can also use the mouse wheel for scrolling through the waveform.

- If the Linked option in the Detection section is deactivated, you can use the green square at the beginning and the red square at the end of the audio file to graphically adjust the Open and Close Threshold values (respectively). When “Linked” is activated, you can use either square to adjust both values. The Open and Close Threshold values in the Detection section reflect these changes.

Making settings and processing

The lower part of the Detect Silence dialog provides settings for the detection and processing of “silent” sections. Proceed as follows:

1. Adjust the settings in the Detection section to the left. The settings have the following functionality:

Setting	Description
Open Threshold	When the audio level exceeds this value, the function “opens”, i.e. lets the sound pass. Audio material below the set level is detected as “silence”. Set this value low enough to open when a sound starts, but high enough to remove unwanted noise during “silent” sections.
Close Threshold	When the audio level drops below this value, the function “closes”, i.e. sounds below this level are detected as “silence”. This value cannot be higher than the Open Threshold value. Set this value high enough to remove unwanted noise during “silent” sections.
Linked	If this checkbox is activated, the Open and Close Threshold values are always set to the same value.

Setting	Description
Min. time open	Determines the minimum time that the function will remain “open” after the audio level has exceeded the Open Threshold value. If the audio contains repeated short sounds, and you find that this results in too many short “open” sections, try raising this value.
Min. time closed	Determines the minimum time that the function will remain “closed” after the audio level has dropped below the Close Threshold value. Set this to a low value to avoid removing sounds.
Pre-roll	Allows you to cause the function to “open” slightly before the audio level exceeds the Open Threshold value. In other words, the start of each “open” section is moved to the left according to the time you set here. This is useful to avoid removing the attack of sounds.
Post-roll	Allows you to cause the function to “close” slightly after the audio level drops below the Close Threshold value. This is useful to avoid removing the natural decay of sounds.

2. Click the Compute button.

The audio event is analyzed, and the waveform display is redrawn to indicate which sections are considered “silent” according to your settings. Above the Compute button, the number of detected regions is displayed.

⇒ If you activate the Auto checkbox next to the Compute button, the audio event is analyzed (and the display is updated) automatically every time you change the settings in the Detection section of the dialog. Deactivate this option when you are working with very long files, as this process might take some time.

3. Click “Preview” to listen to the result.

The event is played back repeatedly in its entire length, but with the “closed” sections silenced.

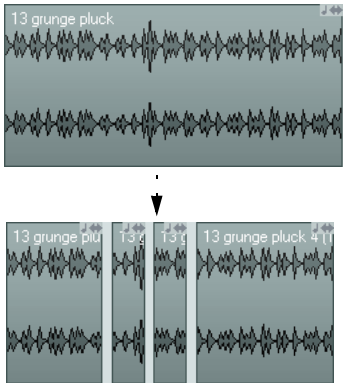
4. Adjust the settings in the Detection section until you are satisfied with the result.

5. In the Output section, activate the “Add as Regions” or the “Strip Silence” option, or both.
“Add as Regions” will create regions according to the non-silent sections. “Strip Silence” will split the event at the beginning and end of each non-silent section, and remove the silent sections in between.

⇒ If you activate the “Add as Regions” option, you can specify a name for the regions in the Region Name field. In addition to the name, the regions will be numbered, starting with the number specified in the “Auto Number Start” field.

⇒ If you have selected more than one event, you can activate the “Process all selected Events” checkbox to apply the same settings to all selected events.

6. Click the Process button.
The event is split and/or regions are added.

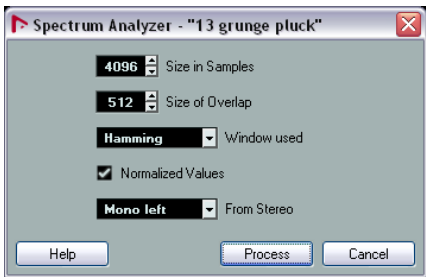


⇒ If you have selected more than one event and did not activate the “Process all selected Events” option in the Output section, the dialog opens again after processing, allowing you to make separate settings for the next event.

The Spectrum Analyzer

This function analyzes the selected audio, computes the average “spectrum” (level distribution over the frequency range) and displays this as a two-dimensional graph, with frequency on the x-axis and level on the y-axis.

- 1. Make an audio selection (a clip, an event or a range selection).**
- 2. Select “Spectrum Analyzer” from the Audio menu.**
A dialog with settings for the analysis appears.

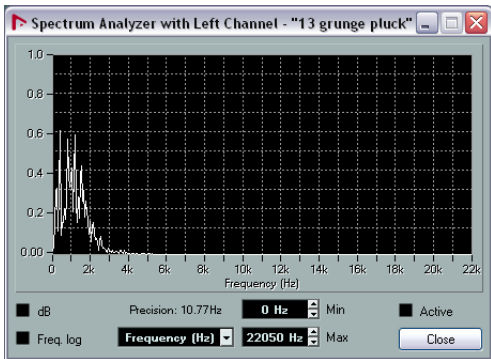


The default values give good results in most situations, but you can adjust the settings if you like:

Option	Description
Size in Samples	The function divides the audio into "analysis blocks", the size of which is set here. The larger this value, the higher the frequency resolution of the resulting spectrum.
Size of Overlap	The overlap between each analysis block.
Window used	Allows you to select which window type is used for the FFT (Fast Fourier Transform, the mathematical method used for computing the spectrum).
Normalized Values	When this is activated, the resulting level values are scaled, so that the highest level is displayed as "1" (0dB).
From Stereo	When analyzing stereo material, there is a pop-up menu with the following options: Mono mix – the stereo signal is mixed to mono before analyzing. Mono left/right – the left or right channel signal is used for analysis. Stereo – both channels are analyzed (two separate spectrums will be displayed).

3. Click the Process button.

The spectrum is computed and displayed as a graph.



4. You can adjust the display with the settings in the display window:

Setting	Description
dB	When this is activated, the vertical axis shows dB values. When it is deactivated, values between 0 and 1 are shown.
Freq. log	When this is activated, frequencies (on the horizontal axis) are displayed on a logarithmic scale. When it is deactivated, the frequency axis is linear.
Precision	Indicates the frequency resolution of the graph. This value cannot be changed here, but is governed by the Size in Samples setting in the previous dialog.
Frequency/Note	Allows you to select whether you want the frequencies to be displayed in Hertz or with note names.

Setting	Description
Min.	Sets the lowest frequency shown in the graph.
Max.	Sets the highest frequency shown in the graph. By adjusting the Min and Max values, you can take a closer look at a smaller frequency range.
Active	When this is activated, the next Spectrum Analysis will appear in the same window. When deactivated, new Spectrum Analysis results will appear in separate windows.

5. If you move the mouse pointer over the graph, a cross-hair cursor follows the graph curve and the display in the upper right corner shows the frequency/note and level at the current position.

To compare the level between two frequencies, move the pointer to one of the frequencies, right-click once and move the pointer to the second frequency. The delta value (the difference in level between the current position and the right-click position) is displayed in the upper right corner (labeled "D").

▪ If you analyze stereo audio and selected the "Stereo" option in the first dialog, the graphs for the left and right channel are superimposed in the display, with the left channel graph in white and the right channel graph in yellow. The display in the upper right corner shows the values for the left channel – to see the right channel values, hold down [Shift]. An "L" or "R" is displayed to indicate which channel values are shown.

6. You can leave the window open or close it by clicking the "Close" button.

If you leave it open and the "Active" checkbox is ticked, the result of the next Spectrum Analysis will be displayed in the same window.

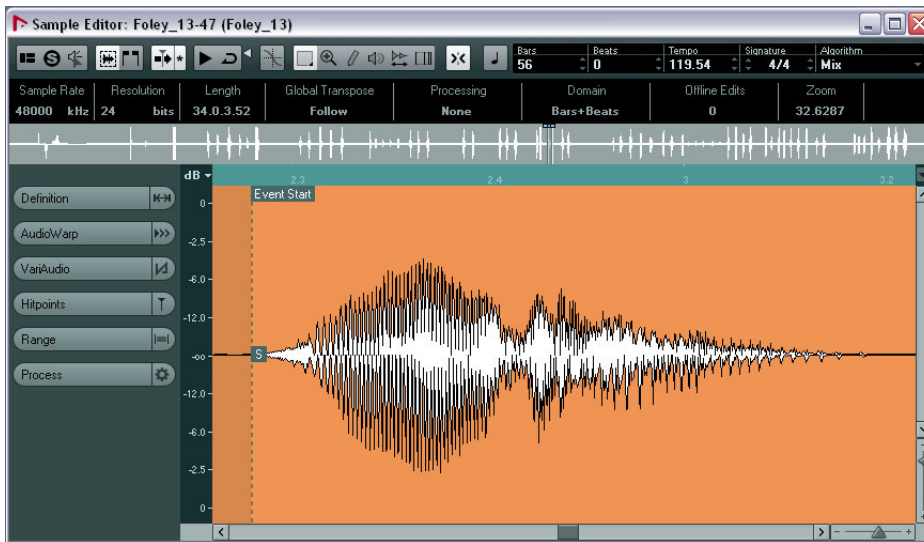
Statistics

Channel	Left	Right
Min. Sample Value:	-0.396 -8.05 dB	-0.346 -9.22 dB
Max. Sample Value:	0.423 -7.47 dB	0.382 -8.37 dB
Peak Amplitude:	-7.47 dB	-8.37 dB
DC Offset:	0.00 % -∞ dB	0.00 % -∞ dB
Estimated Resolution:	16 Bit	16 Bit
Estimated Pitch:	1129.6 Hz/C#5 1106.2 Hz/C#5	
Sample Rate:	44.100 kHz	44.100 kHz
Min. RMS Power:	-48.22 dB	-49.14 dB
Max. RMS Power:	-17.71 dB	-18.71 dB
Average:	-24.79 dB	-25.80 dB

The Statistics function on the Audio menu analyzes the selected audio (events, clips or range selections) and displays a window with the following information:

Item	Description
Min. Sample Value	The lowest sample value in the selection, as a value between -1 and 1 and in dB.
Max. Sample Value	The highest sample value in the selection, as a value between -1 and 1 and in dB.
Peak Amplitude	The largest sample value (in absolute numbers) in the selection, in dB.
DC Offset	The amount of DC Offset (see "Remove DC Offset" on page 271) in the selection, as a percentage and in dB.
Estimated Resolution	Even though an audio file is in 16 or 24 bits, it may have been converted from a lower resolution. The Estimated Resolution value makes an educated guess about the actual audio resolution, by computing the smallest level difference between two samples.
Estimated Pitch	The estimated pitch of the audio selection.
Sample Rate	The sample rate of the audio selection.
Min. RMS Power	The lowest loudness (RMS) measured in the selection.
Max. RMS Power	The highest loudness (RMS) measured in the selection.
Average	The average loudness over the whole selection.

Window overview



The Sample Editor allows you to view and manipulate audio by cutting and pasting, removing, or drawing audio data, and by processing or applying effects (see the chapter [“Audio processing and functions”](#) on [page 263](#)). This editing is “non-destructive”: The actual file (if created or imported from outside the project) will remain untouched so that you can undo modifications or revert to the original settings at any time using the Offline Process History dialog (see [“The Offline Process History dialog”](#) on [page 275](#)).

The Sample Editor also contains most of the AudioWarp related functions, i.e. the realtime time stretching as well as the pitch-shifting functions in Nuendo. These can be used to match the tempo of audio loops to the project tempo (see [“AudioWarp: Tempo matching audio”](#) on [page 293](#)).

Another special feature of the Sample Editor is hitpoint detection. Hitpoints allow you to create “slices”, which can be useful in many situations, for example, if you want to change the tempo without affecting the pitch (see [“Working with hitpoints and slices”](#) on [page 299](#)).

The VariAudio features allow you to edit monophonic vocal recordings in pitch and time, as easily as editing MIDI in the Key Editor. In these realtime pitch modifications the transitions are kept so that the sound remains natural. The pitch detection and correction is “non-destructive”, i.e. you can always undo modifications or revert to the original versions, see [“VariAudio”](#) on [page 302](#) for details.

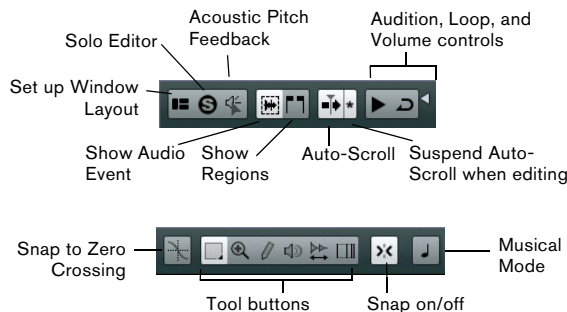
⇒ The term “loop” is used throughout this chapter and in this context usually means an audio file with a musical time base. That means that the length of the loop represents a certain number of bars and beats at a certain tempo. Playing the loop back at the right tempo in a cycle set to the correct length will produce a continuous loop without gaps.

Opening the Sample Editor

To open the Sample Editor, double-click an audio event in the Project window or the Audio Part Editor, or double-click an audio clip in the Pool. You can have more than one Sample Editor window open at the same time.

⇒ Double-clicking an audio part in the Project window opens the Audio Part Editor, even if the part contains a single audio event only. The Audio Part Editor is described in a separate chapter, see [“The Audio Part Editor”](#) on [page 314](#).

The toolbar



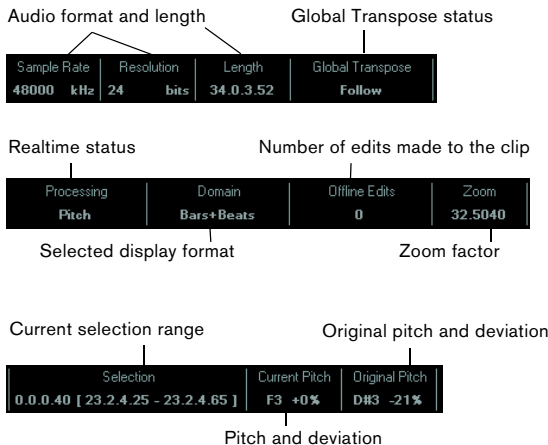
To the right of the tools, the estimated length of your audio file is displayed in bars and beats (PPQ) together with the estimated tempo and the time signature. If you want to use Musical Mode, always verify that the length in bars corresponds to the audio file you imported. If necessary, listen to your audio and enter the correct bar length. The Algorithm pop-up menu allows you to select an algorithm for the realtime time stretching (see [“Selecting an algorithm for the flattening”](#) on [page 312](#)).

Bars	Beats	Tempo	Signature	Algorithm
56	0	119.54	4/4	Mix

You can customize the toolbar by right-clicking it and using the context menu to hide or show items. For further information about configuring the toolbar, see [“Using the Setup options”](#) on [page 572](#).

The info line

The info line is displayed below the toolbar. It shows information about the audio clip:



Initially, length and position values are displayed in the format specified in the Project Setup dialog. For information about configuring the info line, see [“Using the Setup options”](#) on [page 572](#).

- To show or hide the info line, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Info Line option.

The Sample Editor Inspector

On the left in the Sample Editor, you will find the Sample Editor Inspector. It contains tools and functions for working in the Sample Editor.

For more information on the handling of the various Inspector tabs, see the chapter [“The Project window”](#) on [page 38](#).

The Definition tab



The Definition tab helps you to adjust the audio grid and define the musical context of your audio. This is useful if you have an audio loop or audio file that you want to match to the project tempo, see [“AudioWarp: Tempo matching audio”](#) on [page 293](#). If the Definition tab is open, a second ruler is displayed, showing the musical structure of your audio.

The AudioWarp tab

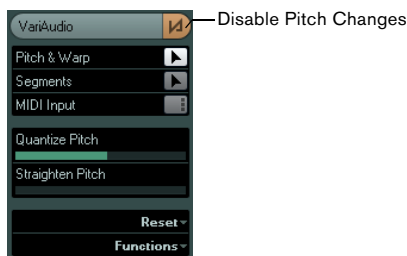


The AudioWarp tab lets you perform timing settings for your audio. This includes applying swing and manually changing the rhythm of the audio by dragging beats to time positions in the grid (see [“Free Warp”](#) on [page 297](#)).

- If you click the “Disable Warp Changes” button, any warp modifications you have made are disabled, allowing you to compare the modified sound with the original sound of your audio.

However, the display does not change. The time stretch applied by the Musical Mode is not disabled by this. “Disable Warp Changes” is deactivated when you reset your warp operations or when you close the Sample Editor. It will not be recalled when reopening the Sample Editor.

The VariAudio tab



On this tab you can edit single notes of your audio file and change their pitch and/or timing, in a way that is similar to the editing of MIDI notes (see [“Understanding the waveform display in VariAudio”](#) on [page 302](#)). Furthermore, you can extract MIDI from your audio (see [“Functions – Extract MIDI...”](#) on [page 311](#)).

- If you click the “Disable Pitch Changes” button, any pitch modifications you have made are disabled, allowing you to compare the modified sound with the original sound of your audio.

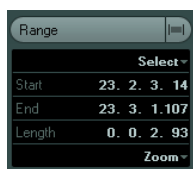
However, the display does not change. “Disable Pitch Changes” is deactivated when you reset your pitch or warp operations or when you close the Sample Editor. It will not be recalled when reopening the Sample Editor.

The Hitpoints tab



On this tab, the transients or hitpoints of the audio can be marked and edited (see [“Working with hitpoints and slices”](#) on [page 299](#)). Hitpoints allow you to slice your audio, and to create groove quantize maps from your audio. You can also create markers, regions, and events based on hitpoints.

The Range tab



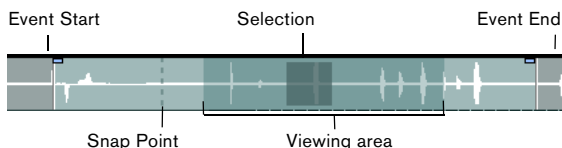
On this tab you will find functions for working with ranges and selections (see [“Making selections”](#) on [page 289](#)).

The Process tab



This tab regroups the most important audio editing commands from the Audio and Edit menus. For further information on the options contained in the Select Process and Select Plug-in pop-up menus, see the chapter [“Audio processing and functions”](#) on [page 263](#).

The Overview line



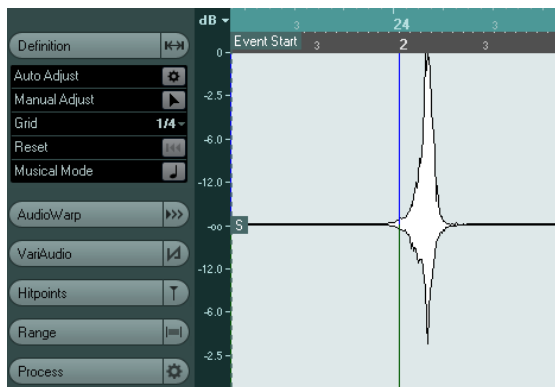
The Overview line displays the whole clip. The section currently shown in the main waveform display of the Sample Editor (the viewing area) is indicated by a rectangle in the Overview line, and the current selection range is also shown. If the “Show Audio Event” button is activated on the toolbar, event start/end and snap point are shown in the Overview line.

- To view other sections of the clip, move the viewing area in the Overview line.
Click in the lower half of the viewing area and drag to the left or right to move it.
- To zoom in or out, horizontally, resize the viewing area by dragging its left or right edge.

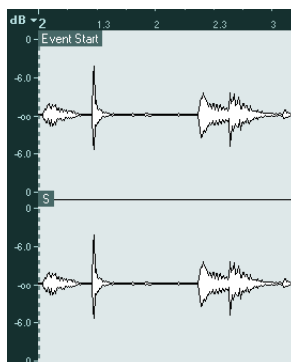
- To define a new viewing area, click in the upper half of the Overview and drag a rectangle.

The ruler

The Sample Editor ruler is located between the Overview line and the waveform display. The ruler is explained in detail in the section [“The ruler”](#) on [page 47](#). When the Definition tab is open, an additional ruler displays the musical structure of the audio file.



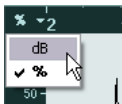
The waveform display and the level scale



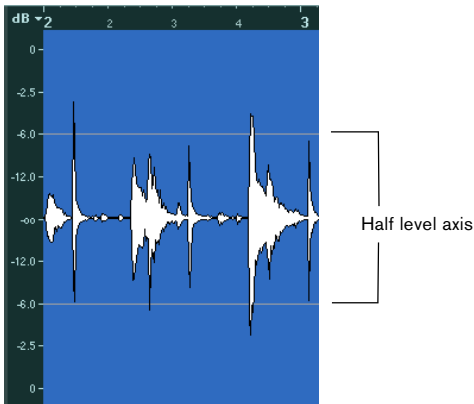
The waveform display shows the waveform image of the edited audio clip according to the wave image style set in the Preferences dialog (Event Display–Audio page), see [“Adjusting how parts and events are shown”](#) on [page 60](#). To the left of the waveform display a level scale is shown, indicating the amplitude of the audio.

- You can select whether the level is shown as a percentage or in dB.

This is done by opening the level scale pop-up menu at the top of the level scale and selecting an option.



- Select the “Show Half Level Axis” option on the context menu of the waveform display, if you want the half level axes to be shown.



Operations

Zooming

Zooming in the Sample Editor is done according to the standard zoom procedures, with the following special notes to keep in mind:

- The vertical zoom slider changes the vertical scale relative to the height of the editor window, in a way similar to the waveform zooming in the Project window (see “[Zoom and view options](#)” on [page 58](#)).

The vertical zoom will also be affected if the “Zoom Tool Standard Mode: Horizontal Zooming Only” preference (Editing—Tools page) is deactivated and you drag a rectangle with the Zoom tool.

The following options relevant to the Sample Editor are available on the Zoom submenu of the Edit menu or the context menu:

Option	Description
Zoom In	Zooms in one step, centering on the position cursor.
Zoom Out	Zooms out one step, centering on the position cursor.
Zoom Full	Zooms out so that the whole clip is visible in the editor.
Zoom to Selection	Zooms in so that the current selection fills the editor display.
Zoom to Selection (Horiz.)	Zooms in horizontally so that the current selection fills the editor display.
Zoom to Event	Zooms in so that the editor shows the section of the clip corresponding to the edited audio event. This is not available if you have opened the Sample Editor from the Pool (in which case the whole clip is opened for editing, not an event).
Zoom In/Out Vertically	This is the same as using the vertical zoom slider (see above).
Undo/Redo Zoom	These options allow you to undo/redo the last zoom operation.

- When the VariAudio tab is active (see “[VariAudio](#)” on [page 302](#)), you can also zoom by holding down [Alt]/[Option] while drawing a selection rectangle around the segments that you want to zoom in on. You can zoom out by holding down [Alt]/[Option] and clicking in an empty area of the waveform.

- The current zoom setting is shown in the info line, as a “samples per screen pixel” value.

⇒ You can zoom in horizontally to a scale of less than one sample per pixel! This is required for drawing with the Pencil tool (see “[Drawing in the Sample Editor](#)” on [page 292](#)).

- If you have zoomed in to one sample per pixel or less, the appearance of the samples depends on the “Interpolate Audio Images” option in the Preferences dialog (Event Display—Audio page).

If the option is deactivated, single sample values are drawn as “steps”. If the option is activated, they are interpolated to a “curve” form.

Auditioning

While you can use the regular play commands to play back audio when the Sample Editor is open, it is often useful to listen to the edited material only.

⇒ When auditioning, audio is routed to the Control Room (if activated) or to the Main Mix (the default output bus). For information about routing, see [“Routing”](#) on [page 168](#).



Clicking the Audition icon on the toolbar plays back the edited audio, according to the following rules:

- If you have made a selection, this selection will be played back.
- If there is no selection and “Show Event” is deactivated, playback will start at the cursor position.
- If the Audition Loop icon is activated, playback will continue repeatedly until you deactivate the Audition Loop icon. Otherwise, the section will be played back once.

⇒ There is a separate Play button for auditioning regions, see [“Auditioning regions”](#) on [page 291](#).

Using the Speaker tool

If you click somewhere in the waveform display with the Speaker (“Play”) tool and keep the mouse button pressed, the clip is played back from the position where you click. Playback will continue until you release the mouse button.

Using Acoustic Feedback



If you activate the “Acoustic Pitch Feedback” button on the toolbar, the audio will be played back when you edit it vertically, i.e. when you change the pitch. This way you can easily audition your modifications.

Using key commands

If you activate the “Playback Toggle triggers Local Preview” option in the Preferences dialog (Transport page), you can start/stop auditioning by pressing [Space]. This is the same as clicking the Audition icon on the toolbar.

⇒ The Sample Editor also supports the “Preview start” and “Preview stop” key commands in the Media category of the Key Commands dialog. These key commands stop the current playback, whether you are in normal playback or in audition mode.

Scrubbing



The Scrub tool allows you to locate positions in the audio by playing back, forwards, or backwards, at any speed:

1. Select the Scrub tool.
2. Click in the waveform display and keep the mouse button pressed.

The project cursor is moved to the position where you clicked.

3. Drag to the left or right.

The audio is played back. The speed and pitch of the playback depend on how fast you drag.

Adjusting the snap point

The snap point is a marker within an audio event. It is used as a reference position when you move events with snap activated, so that the snap point is “magnetic” to whatever snap positions you have selected.

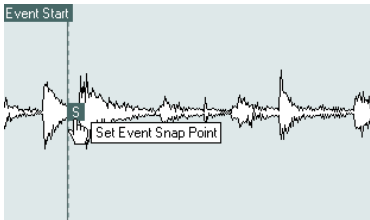
By default, the snap point is set at the beginning of the audio event, but often it is useful to move the snap point to a “relevant” position in the event, such as a downbeat.

To adjust the snap point, proceed as follows:

1. Activate the “Show Audio Event” option on the toolbar, so that the event is displayed in the editor.
2. If needed, scroll until the event is visible, and locate the “S” flag in the event.

If you have not adjusted this previously, it is located at the beginning of the event.

3. Click on the “S” flag and drag it to the desired position. You can also adjust the snap point by setting the project cursor at the desired position, and selecting “Snap Point To Cursor” on the Audio menu.



The snap point will be set to the position of the cursor. This method can also be used in the Project window and the Audio Part Editor.

It is also possible to define a snap point for a clip (for which there is no event yet).

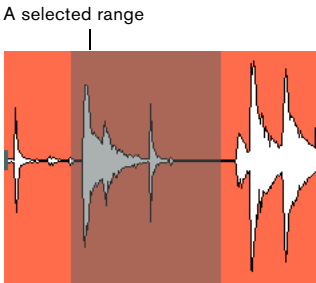
⚠ When you set the grid start on the Definition tab, the snap point is moved to the grid start (see [“Manual Adjust”](#) on [page 295](#)).

To open a clip in the Sample Editor, double-click it in the Pool. After having set the snap point you can insert the clip into the project from the Pool or the Sample Editor with the set snap point position.

⚠ Events and clips can have different snap points. If you open a clip from the Pool you can edit the clip snap point. If you open a clip from within the project window, you can edit the event snap point. The clip snap point serves as a template for the event snap point. However, it is the event snap point that is taken into account when snapping.

Making selections

To select an audio section in the Sample Editor, click and drag with the Range Selection tool.



- If “Snap to Zero Crossing” is activated on the toolbar, the selection’s start and end are always at zero crossings.
- You can resize the selection by dragging its left and right edge or by [Shift]-clicking.
- The current selection is indicated in the corresponding fields on the Range tab of the Sample Editor Inspector. You can fine-tune the selection by changing these values. Note that the values are relative to the start of the clip, rather than to the project timeline.

Using the Select menu

On the Select menu on the Range tab and in the Select submenu of the Edit menu you find the following options:

Option	Description
Select All	Selects the whole clip.
Select None	Selects no audio (the selection length is set to “0”).
Select in Loop	Selects all audio between the left and right locator.
Select Event	Selects only the audio that is included in the edited event. This is grayed out if you have opened the Sample Editor from the Pool (in which case the whole clip is opened for editing, not an event). If the VariAudio tab is open and your audio file is split into separate segments (see “Segments mode” on page 304), all segments are selected.
Locators to Selection (Range tab only)	Sets the locators to encompass the current selection. This is available if you have selected one or several events or made a selection range.
Locate Selection (Range tab only)	Moves the project cursor to the beginning or end of the current selection. For this to be available, you must have selected one or more events or parts, or made a selection range.
Loop Selection (Range tab only)	This activates playback from the start of the current selection and keeps starting over again when reaching the selection end.

Option	Description
From Start to Cursor (Edit menu only)	Selects all audio between the clip start and the project cursor.
From Cursor to End (Edit menu only)	Selects all audio between the project cursor and the end of the clip. For this to work, the project cursor must be within the clip boundaries.
Equal Pitch - all Octaves/ same Octave	This function requires that the audio event has been analyzed using the VariAudio features and that one or several notes are selected. These options select all notes of this event that have the same pitch as the currently selected note(s) (in any octave or in the current octave).
Left Selection Side to Cursor (Edit menu only)	Moves the left side of the current selection range to the project cursor position. For this to work, the cursor must be within the clip boundaries. This function is not available for VariAudio segments.
Right Selection Side to Cursor (Edit menu only)	Moves the right side of the current selection range to the project cursor position (or the end of the clip, if the cursor is to the right of the clip). This function is not available for VariAudio segments.

Editing selection ranges

Selections in the Sample Editor can be processed in several ways.

If you attempt to edit an event that is a shared copy (i.e. the event refers to a clip that is used by other events in the project), you are asked whether you want to create a new version of the clip.

- Select “New Version” if you want the editing to affect the selected event only. Select “Continue” if you want the editing to affect all shared copies.

⇒ If you activate the “Please, don’t ask again” option in the dialog, any further editing will conform to the selected method (“Continue” or “New Version”). You can change this setting at any time with the “On Processing Shared Clips” pop-up menu in the Preferences dialog (Editing–Audio page).

- Any changes to the clip are shown in the Offline Process History, making it possible to undo them later (see “The Offline Process History dialog” on page 275).

Cut, Copy, and Paste

The Cut, Copy, and Paste commands (on the Edit menu, on the Process tab of the Sample Editor Inspector, or in the main Edit menu) work according to the following rules:

- Selecting Copy copies the selection to the clipboard.

- Selecting Cut removes the selection from the clip and moves it to the clipboard. The section to the right of the selection is moved to the left to fill the gap.

- Selecting Paste copies the data from the clipboard into the clip.

If there is a selection in the editor, this is replaced by the pasted data. If there is no selection, the pasted data is inserted starting at the project cursor. The section to the right of the line is moved to make room for the pasted material.

Delete

Selecting Delete (on the Edit menu, on the Process tab of the Sample Editor Inspector, or in the main Edit menu) removes the selection from the clip. The section to the right of the selection is moved to the left to fill the gap.

Insert Silence

Selecting “Insert Silence” (on the Edit menu, on the Process tab of the Sample Editor Inspector, or in the Range submenu of the main Edit menu) inserts a silent section with the same length as the current selection, at the selection start.

- The selection is not replaced, but moved to the right to make room.

If you want to replace the selection, use the “Silence” function instead (see “Silence” on page 272).

Processing

The Processing features (on the Select Process menu, on the Process tab of the Sample Editor Inspector, or in the Process submenu of the Audio menu) can be applied to selections in the Sample Editor, as well as the effects (on the Select Plug-in menu on the Process tab of the Sample Editor Inspector or in the Plug-ins submenu of the Audio menu). For more information, see the chapter “Audio processing and functions” on page 263.

Creating a new event from the selection using drag & drop

To create a new event that plays only the selected range, proceed as follows:

1. Make a selection range.
2. Drag the selection range to an audio track in the Project window.

Creating a new clip or audio file from the selection

To extract a selection from an event and either create a new clip or a new audio file, proceed as follows:

1. Make a selection range.
2. Open the context menu and select “Bounce Selection” from the Audio submenu.

A new clip is created and added to the Pool, and another Sample Editor window opens with the new clip. This clip refers to the same audio file as the original clip, but contains the audio corresponding to the selection range only.

Working with regions

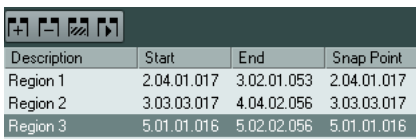
Regions are sections within a clip. One of the main uses for regions is Cycle recording, in which the different “takes” are stored as regions (see “[Recording audio in cycle mode](#)” on [page 99](#)). You can also use this feature for marking important sections in the audio clip. Regions can be dragged into the Project window from the Sample Editor or the Pool to create new audio events.

Regions are best created, edited, and managed in the Sample Editor.

Creating and removing regions

1. Select the range that you want to convert into a region.
2. Click the “Set up Window Layout” button and activate the Regions option.

The regions list is displayed on the right.



Description	Start	End	Snap Point
Region 1	2.04.01.017	3.02.01.053	2.04.01.017
Region 2	3.03.03.017	4.04.02.056	3.03.03.017
Region 3	5.01.01.016	5.02.02.056	5.01.01.016

3. Click the Add Region button above the regions list (or select “Event or Range as Region” from the Advanced submenu of the Audio menu).

A region is created, corresponding to the selected range.

4. To name the region, double-click on it in the list and enter a new name.

Using this procedure, regions can be renamed at any time.

- When you click on a region in the regions list, it is instantly displayed in the Sample Editor.

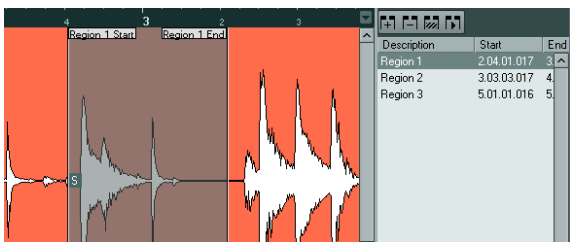
- To remove a region from a clip, select it in the list and click the Remove Region button above the list.

Creating regions from hitpoints

If your audio event contains calculated hitpoints, you can choose to automatically create regions from hitpoints. This can be useful to isolate recorded sounds. For further information on hitpoints, see “[Working with hitpoints and slices](#)” on [page 299](#).

Editing regions

The region selected in the list is displayed in gray in the waveform display and the overview line.



There are two ways to edit the start and end positions of a region:

- Click and drag the region start and end handles in the waveform display (with any tool).

When you move the pointer over the handles, it automatically changes to indicate that you can drag the handles.

- Edit the Start and End positions in the corresponding fields in the regions list.

The positions are shown in the display format selected for the ruler and info line, but are relative to the start of the audio clip rather than the project timeline.

Auditioning regions

You can listen to a region by selecting it in the list and clicking the Play Region button above the list. The region will play back once or repeatedly, depending on whether the Loop icon on the toolbar is activated or not.

You can also listen to a region by selecting it in the list and clicking the Audition icon on the toolbar. This way you can preview separate regions by clicking on them in the list or by selecting them with the up/down arrow keys on your computer keyboard.

Making selections from regions

If you select a region in the list and click the Select Region button above, the corresponding section of the audio clip is selected (as if you had selected it with the Range Selection tool) and zoomed. This is useful if you want to apply processing to the region only.

⇒ You can also double-click a region in the Pool to have its audio clip opened in the Sample Editor with the area of the region automatically selected.

Creating audio events from regions

To create new audio events from regions using drag & drop, proceed as follows:

1. In the list, click on the region and keep the mouse button pressed.

2. Drag the region to the desired position in the project and release the mouse button.

A new event is created.

- You can also use the “Events from Regions” function from the Advanced submenu of the Audio menu (see “[Region operations](#)” on [page 79](#)).

Exporting regions as audio files

If you create a region in the Sample Editor, the region can be exported to disk as a new audio file. This is done from the Pool, see “[Exporting regions as audio files](#)” on [page 330](#).

Drawing in the Sample Editor

It is possible to edit the audio clip at sample level by drawing with the Pencil tool. This can be useful if you need to manually edit out a spike or click, etc.

Proceed as follows:

1. Zoom in to a zoom value lower than 1.

This means that there is more than one screen pixel per sample.

2. Select the Pencil tool.

3. Click and draw at the desired position in the waveform display.

When you release the mouse button, the edited section is automatically selected.

⇒ The Pencil tool cannot be used when the VariAudio tab is open.

Options and settings

Show Audio Event

When the “Show Audio Event” button is activated on the toolbar, the section corresponding to the edited event is highlighted in the waveform display and the Overview. The sections of the audio clip not belonging to the event are shown with a gray background.

⚠ This button is only available if you have opened the Sample Editor by double-clicking an audio event in the Project window or the Audio Part Editor. It is not available if you have opened the audio event from the Pool.



- In this mode, you can adjust the start and end of the event in the clip by dragging the event handles in the waveform display.

Snap



The Snap function helps you to find exact positions when editing in the Sample Editor by restricting horizontal movement and positioning to certain grid positions. You turn Snap on or off by clicking the Snap button in the Sample Editor toolbar.

⇒ The Sample Editor Snap function is independent of the Snap setting in the Project window toolbar or other editors. It has no effect outside the Sample Editor.

Snap to Zero Crossing



When this option is activated, editing is done at zero crossings (positions in the audio where the amplitude is zero). This helps you to avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

⇒ If hitpoints have been calculated, these are also taken into account when snapping to zero crossings.

⇒ The Sample Editor function “Snap to Zero Crossing” is independent of the same setting in the Project window toolbar or other editors. It has no effect outside the Sample Editor.

Auto-Scroll



When the Auto-Scroll option is activated on the Sample Editor toolbar, the waveform display will scroll during playback, keeping the project cursor visible in the editor.

⇒ This setting is independent of the Auto-Scroll setting in the Project window toolbar or other editors.

AudioWarp: Tempo matching audio

AudioWarp means realtime time stretching functions in Nuendo. The main AudioWarp features are tempo matching audio loops to the project tempo and matching up an audio clip with fluctuating tempo to a fixed tempo.

Musical Mode

If you want to tempo match an audio loop to the project tempo, you will normally work with loops with straight beats. In this case you only need to activate the Musical Mode on the toolbar.

The Musical Mode is one of the key AudioWarp features. It allows you to lock audio clips to the project tempo by using realtime time stretching. This is very useful if you want to use loops in your project without worrying too much about timing.

When Musical Mode is activated, audio events will adapt to any tempo changes in Nuendo, just like MIDI events.



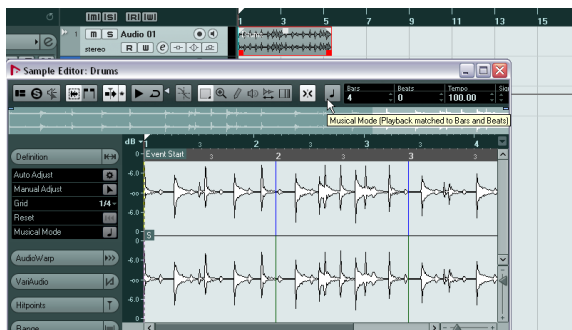
You can activate Musical Mode on the AudioWarp tab, the Definition tab, and the toolbar.

It is also possible to activate/deactivate Musical Mode from within the Pool by clicking the corresponding check-box in the Musical Mode column.

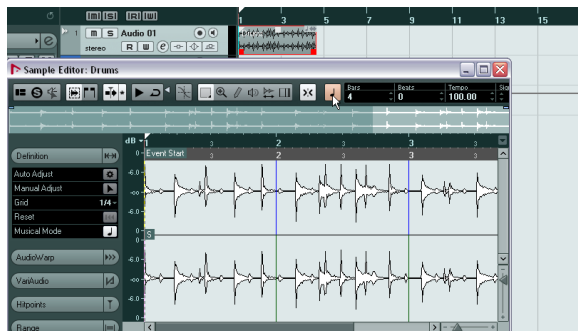
To tempo match an audio loop to the project tempo, proceed as follows:

1. Import your loop into the project and double-click it to open the Sample Editor.

If you open the Definition tab and take a look at the rulers, you will see that the project tempo grid (upper ruler) and the grid of your audio (lower ruler) do not match.



2. Activate the Musical Mode button on the toolbar.
Your clip is warped and stretched automatically to adapt it to the project tempo. The rulers reflect the change.



In the Project window, the audio event is now shown with a note symbol and a double arrow in the upper right corner to indicate that Musical Mode is activated.

The Musical Mode state is saved with the project. This allows you to import files into the project with Musical Mode already activated. The tempo is also saved when exporting files.

⚠ Nuendo supports ACID® loops. These loops are standard audio files but with embedded tempo/length information. When ACID® files are imported into Nuendo, Musical Mode is automatically activated and the loops will adapt to the project tempo.

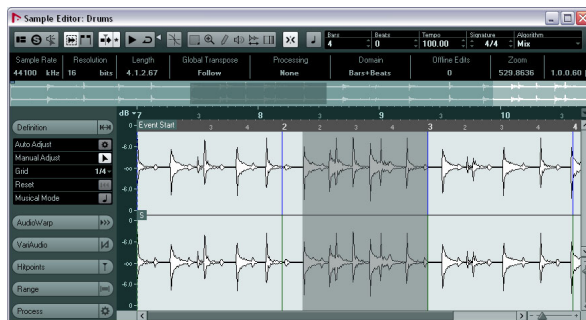
Auto Adjust

If you want to use an audio file with unknown tempo or if the beat of your loop is not straight, you have to change the “definition” of this audio file first. This is done with the Auto Adjust function on the Definition tab of the Sample Editor Inspector.

The Auto Adjust function quantizes your audio automatically, i.e. the transients are moved to exact note values in the audio grid.

Proceed as follows:

1. Open the Sample Editor and define a selection range for your audio clip.
Alternatively, you can define a range by setting the start and end of the audio event.



2. Open the Definition tab and click the Auto Adjust button.

The transients, i.e. the significant positions of your audio are moved to exact note values in the audio grid.



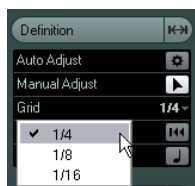
3. Activate the Musical Mode button on the toolbar.
Your clip is warped and stretched automatically to adapt it to the project tempo. The rulers reflect the change.

You can see that the event snap point is moved to the start of the selected range. If you take a look at the lower ruler, you will see that red vertical lines are shown. These indicate that your audio has been aligned to bar and beat positions.

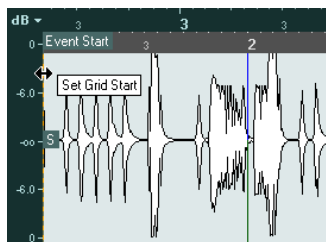
Manual Adjust

You might have a very special loop where the automatic function does not lead to satisfying results. In this case you can manually adjust the grid and tempo of your audio file. Proceed as follows:

1. Open the Definition tab in the Sample Editor Inspector and activate the Manual Adjust tool.
2. Select a suitable value from the Grid pop-up menu. This determines the grid resolution for your audio. The vertical lines of the grid represent bar positions, and the red vertical lines beat positions.



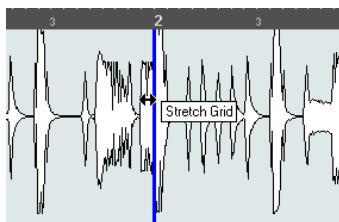
3. Move the mouse pointer to the beginning of the audio file until the tooltip "Set Grid Start" is displayed. The mouse pointer turns into a double arrow to indicate that you can edit the time grid for the audio file.



4. Click and drag to the right to set the grid start at the first downbeat, and release the mouse button. The lower ruler (for the audio) changes to reflect your edits.
5. Audition the file to determine where the second bar in the sample begins.
6. In the upper part of the waveform, move the mouse pointer to the vertical line nearest to the second bar so that the tooltip "Stretch Grid" and a blue vertical line are shown. The functionality of the Manual Adjust tool changes depending on its position, e.g. if applied in the lower part of the waveform on a vertical line, it is used to set a bar position, see below.

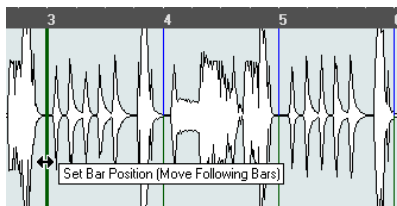
7. Click and drag the blue vertical line to the left or right to the position of the first downbeat in the second bar and release the mouse button.

The beginning of the next bar is set, and all following bars are stretched or compressed by the same amount.



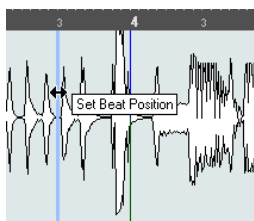
8. Check the positions of the following bars and, if necessary, move the mouse pointer over the grid lines in the lower part of the waveform until the tooltip "Set Bar Position (Move Following Bars)" and a green vertical line are shown.

This allows you to set the bar positions. When you drag the mouse, the beginning of the next bar is set, and the tempo of the previous bar is changed.

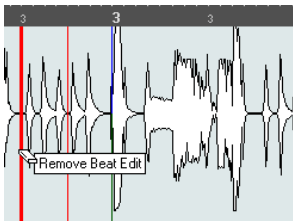


9. Now have a look at the single beats in between the bars and, if necessary, move the mouse pointer to a beat position to adjust them.

The Set Beat Position function is displayed with a light blue line. Drag it until the single beat position is aligned with the waveform, and release the mouse button.



- If you are not satisfied with a specific edit, you can hold down any modifier key and click on the adjusted grid line (bar or beat).
The Eraser tool appears together with a tooltip indicating that you can remove your edit.

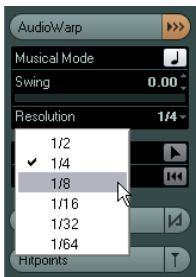


When you are done, you can activate Musical Mode to adjust your audio loop to the project tempo.

Applying swing

If you find that your audio sounds too straight, e.g. after having quantized it with the Auto Adjust function, you can add swing. Proceed as follows:

1. Activate Musical Mode.
2. On the AudioWarp tab, select a suitable grid resolution from the Resolution pop-up menu.
This defines the positions that the swing is applied to. If you select 1/2, the swing is applied in steps of half notes, if you select 1/4, it is applied in steps of quarter notes, etc.

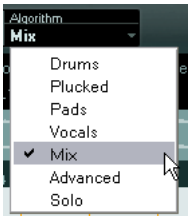


3. Move the Swing fader to the right to offset every second position in the grid.
This creates a swing or shuffle feel.

Depending on how far you move the fader to the right and what grid resolution you chose, this function offers everything from half-note swing to 64th-note swing.

Selecting an algorithm for realtime playback

In the Algorithm pop-up menu on the toolbar you can select the algorithm preset to be applied on realtime playback. This setting affects warp changes in Musical Mode, FreeWarp, Swing, as well as VariAudio warping and pitching (only the Solo preset can be used).



On this pop-up menu you can find various options that govern the audio quality of the realtime time stretching. There are presets that allow you to manually set warp parameters:

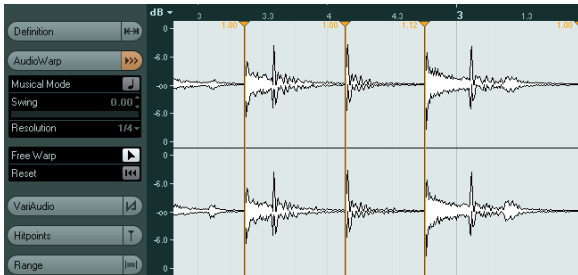
Option	Description
Drums	This mode is best for percussive sounds, because it does not change the timing of your audio. Using this option for pitched audio will lead to noticeable artifacts. In this case, you can try the Mix mode.
Plucked	Use this mode for audio with transients and a relatively stable spectral sound character (e.g. plucked instruments).
Pads	Use this mode for pitched audio with slower rhythm and a stable spectral sound character. This minimizes sound artifacts, but the rhythmic accuracy is not preserved.
Vocals	This mode is suitable for slower signals with transients and a prominent tonal character (e.g. vocals).
Mix	This mode preserves the rhythm and minimizes the artifacts for pitched material which does not meet the above criteria (i.e. with a less homogenous sound character). This is selected by default for audio that is not categorized.
Advanced	This allows for a manual tweaking of the time stretching parameters. By default, the settings that are shown when you open the dialog are those of the last preset used (except if the Solo mode has been selected, see below). The Advanced settings are described more in detail below this table.
Solo	This mode preserves the timbre of the audio. Only use it for monophonic material (solo woodwind/brass instruments or solo vocals, monophonic synths or string instruments that do not play harmonies).

If you select the **Advanced** menu item, a dialog opens where you can manually adjust the three parameters that govern the sound quality of the time stretching:

Parameter	Description
Grain size	The realtime time stretching algorithm splits the audio into small pieces called "grains". This parameter determines the size of the grains. For material with many transients, use low Grain size values for best results.
Overlap	Overlap is the percentage of the whole grain that will overlap with other grains. Use higher values for material with a stable sound character.
Variance	Variance is also a percentage of the whole length of the grains, and sets a variation in positioning so that the overlapping area sounds smooth. A Variance setting of 0 will produce a sound akin to time stretching used in early samplers, whereas higher settings produce more (rhythmic) "smearing" effects but less audio artifacts.

Free Warp

The **Free Warp** tool allows you to create warp tabs. Warp tabs are a kind of marker or anchor that can be attached to musically relevant time positions in an audio event, for example the first beat of every bar. Warp tabs can be dragged to the corresponding time positions in the project, and the audio will be stretched accordingly.



A typical application of warp tabs is to use them to synchronize audio to video (see the chapter [“Audio editing to picture”](#) on [page 535](#)).

⚠ If the **VariAudio** tab is open, only the warp handles are shown.

You can also use warp tabs for further tweaking after having activated **Musical Mode**.

⚠ When you activate or deactivate **Musical Mode** or select another **Resolution** value, all your warp modifications will be lost.

Using the Free Warp tool

Warp tabs are created using the **Free Warp** tool on the **AudioWarp** tab of the **Sample Editor**, but can also be created from hitpoints (see [“Creating warp tabs from hitpoints”](#) on [page 298](#)). In this example, we will show how a file with slightly varying tempo can be locked to a steady tempo by using warp tabs. It illustrates the general methods of using warp tabs and the **Free Warp** tool. But you can of course use warp tabs for other operations than aligning downbeats to grid positions. With the **Free Warp** tool, you can literally stretch any region within a sample to any position!

Proceed as follows:

1. Open the audio file that you wish to process in the **Sample Editor**.
2. Activate the **“Snap to Zero Crossing”** button on the **Sample Editor** toolbar.
When you activate this button, warp tabs will snap to zero crossings and hitpoints (if shown).
3. On the **Definition** tab, click the **Auto Adjust** button.
4. Line up the audio file so that the first beat of the first bar (in the audio event) starts on the first beat of a bar in the project.

▪ If the audio file does not start on a downbeat, you can use the **Event Start** handle in the **Sample Editor** and adjust the position in the **Project** window so that the first downbeat in the sample is aligned with the first beat of a bar in the grid.

Now the first musical downbeat should be aligned with the first beat of a bar in the project.

The next step is to find out where the first warp tab needs to be added. Activate the metronome click on the **Transport** panel and play back your audio clip to determine positions where its tempo drifts from the project tempo.

5. Play back the audio file and determine where the first beat of a bar in the audio event does not match the corresponding ruler position in the project.

If you find it difficult to pinpoint an exact position in the audio event, you can use the Scrub tool and/or zoom in the view.

6. On the AudioWarp tab, select the Free Warp tool, place the pointer at the position of the beat that you want to adjust, click, and hold.

When you place the mouse pointer in the waveform display, it changes to a clock with arrows on either side and a vertical line in the middle, which represents the pointer.

7. With the mouse button still pressed, drag the warp tab to the desired position in the ruler and release the mouse button.

A warp tab is added and your beat should be perfectly aligned with the corresponding position in the project. If the position where you clicked was off, you can adjust it by dragging the handle.

⇒ You can also first add warp tabs at the relevant musical positions and change their positions later, see [“Editing warp tabs”](#) on [page 298](#).

Next to the warp tab handle in the ruler, a number is shown. This number indicates the warp factor, i.e. the amount of stretch. Warp factor numbers higher than 1.0 indicate that the audio region preceding the warp tab is expanded and will play back slower. Warp factor numbers lower than 1.0 indicate that the audio region preceding the warp tab is compressed and will play back faster.

8. Repeat the described steps to align the first beat in each bar to the corresponding ruler position.

⇒ You only have to add warp tabs where the downbeat in the audio file drifts from the ruler position and/or if you want to lock a warp tab so that it is not moved when editing other points.

Editing warp tabs

Moving the destination of existing warp tabs

To move the destination position of a warp tab (and thus stretch or compress the audio), select the Free Warp tool and position the pointer on the warp line in the waveform, click and drag.

Moving the insert position of existing warp tabs

If you wish to change the insert position of a warp tab in the audio, click and drag the warp tab handle in the ruler. This will change the warping.



Disabling warp tabs

You can disable all warp modifications by clicking the “Disable Warp Changes” button on the AudioWarp tab or by setting up and using the “VariAudio - Disable Warp Changes” key command in the Key Commands dialog, Sample Editor category (see [“Key commands”](#) on [page 580](#)).

Deleting warp tabs

To delete a warp tab, hold down [Alt]/[Option] so that the pointer becomes an eraser and click on the warp tab. To delete several warp tabs, hold down [Alt]/[Option] while drawing a selection rectangle.

Resetting warp modifications

To reset your Free Warp edits, click the Reset button on the AudioWarp tab. This also resets the “Disable Warp Changes” button on the same tab.

⇒ If Musical Mode is activated, only Free Warp edits are reset.

Creating warp tabs from hitpoints

You can also create warp tabs from hitpoints by selecting “Create Warp Tabs from Hitpoints” on the Realtime Processing submenu of the Audio menu.

Working with hitpoints and slices

Hitpoint detection is a special feature of the Sample Editor. It detects attack transients in an audio file and adds a type of marker, i.e. a “hitpoint”, at each transient. These hitpoints allow you to create “slices”, where each slice ideally represents each individual sound or “beat” in a loop (drum or other rhythmic loops work best with this feature). When you have successfully sliced the audio file, you can do a number of useful things with it:

- Change the tempo without affecting the pitch.
- Extract the timing (a groove map) from a drum loop. The groove map can then be used to quantize other events.
- Replace individual sounds in a drum loop.
- Edit the actual playing in the drum loop without affecting the basic feel.
- Extract sounds from loops.

You can further edit these slices in the Audio Part Editor. You can, for example:

- Remove or mute slices.
- Change the loop by reordering, replacing, or quantizing slices.
- Apply processing or effects to individual slices.
- Create new files from individual slices using the “Bounce Selection” function on the Audio menu.
- Transpose in realtime and stretch slices.
- Edit slice envelopes.

⇒ Hitpoints are only displayed in the waveform if the Hitpoints tab is open.

Using hitpoints

The main functionality of using hitpoints to slice up a loop is to make a loop fit the tempo of a song, or alternatively to create a situation that allows the song tempo to be changed while retaining the timing of a rhythmic audio loop, just like when using MIDI files.

Which audio files can be used?

Here are some guidelines as to what type of audio files are suited for slicing using hitpoints:

- Each individual sound in the loop should have a noticeable attack.
Slow attacks, legato playing, etc. may not produce the desired result.
- Poorly recorded audio might be difficult to slice correctly.
In these cases, try to normalize the files or to remove DC Offset.

- There may be problems with sounds drowned in smearing effects, like short delays.

Calculating hitpoints and slicing a loop

Before proceeding, check if your audio file is suited for slicing using hitpoints, see above. Proceed as follows:

1. Open the Hitpoints tab and select an option from the Use pop-up menu.

The Use pop-up menu on the Hitpoints tab affects which hitpoints are shown and is a useful tool for removing unwanted hitpoints.

The following options are available:

Option	Description
All	All hitpoints are shown (taking the Sensitivity slider into account).
1/4, 1/8, 1/16, 1/32	Only hitpoints that are close to the selected note value positions within the loop are shown (e.g. close to exact sixteenth note positions). Again, the Sensitivity slider is taken into account.
Metric Bias	This is like the “All” mode, but all hitpoints that are close to even meter divisions (1/4, 1/8, 1/16, etc.) get a “sensitivity boost” – they are visible at lower sensitivity settings. This is useful if you are working with dense or cluttered material with a lot of hitpoints, but you know that the material is based on a strict meter. By selecting Metric Bias it is easier to find the hitpoints close to the meter position (although most other hitpoints are also available, at higher sensitivity settings).

⇒ If you select one of the options of the Use pop-up menu (except “All”), a second ruler that displays the musical structure of the audio file is shown below the ordinary ruler.

2. Move the Sensitivity slider to the right to add hitpoints or to the left to remove unwanted hitpoints until one individual sound is played between two hitpoints.

If your main reason for slicing the loop is to change the tempo, you generally need as many slices as you can get, but never more than one per individual “hit” in the loop. If you want to create a groove, try to get approximately one slice per eighth note, sixteenth note, or whatever the loop requires (see “[Creating groove quantize maps](#)” on [page 301](#)).

In the next step, the loop will be adapted to the project tempo set in Nuendo.

3. On the Hitpoints tab, click the Create Slices button or select “Create Audio Slices from Hitpoints” from the Hitpoints submenu of the Audio menu.

The following happens:

- The Sample Editor closes.
- The audio event is “sliced” so that the sections between the hitpoints become separate events, all referring to the same original file.
- The audio event is replaced by an audio part, containing the slices (double-click the part to view the slices in the Audio Part Editor).

⚠ When you create slices, all events referring to the edited clip are also replaced.

- The loop is automatically adapted to the project tempo. This takes the specified loop length into account: e.g., if the loop was one bar long, the part is resized to fit exactly one bar in the Nuendo tempo, and the slices are moved accordingly, keeping their relative positions within the part.
- In the Pool, the sliced clip is shown with a different icon. Dragging the sliced clip from the Pool to an audio track creates an audio part with the slices adapted to the project tempo, just as above.

4. Activate cycle playback on the Transport panel.

The loop should now play back seamlessly at the tempo set in the project!

Hitpoints and tempo settings

The musical time base setting and the project tempo affect how your loops are played back.

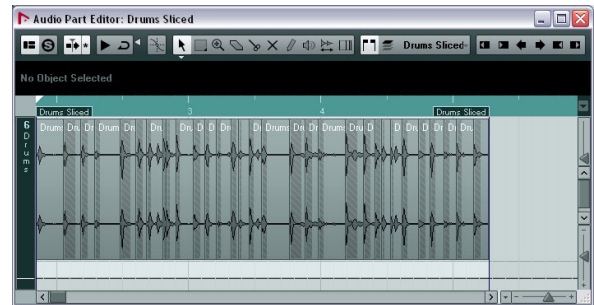
- Make sure that the “Musical time base” button in the track list or Inspector is activated (the button shows a note symbol – see “[Switching between musical and linear time base](#)” on [page 63](#)). This way the loop will follow any further tempo changes.

- If the project tempo is slower than the original tempo of the loop, there may be audible gaps between each slice event in the part.

To remedy this, you can use the Close Gaps function on the Advanced submenu of the Audio menu, see “[Close Gaps](#)” on [page 302](#). Also consider activating auto fades for the corresponding audio track – fade-outs set to about 10ms will help eliminate any clicks between the slices when you play back the part. See “[Auto fades and crossfades](#)” on [page 120](#) for details.

- If the project tempo is higher than the loop’s original tempo, you may want to activate auto crossfades for the track.

You can use the Close Gaps functions in this case as well, see “[Close Gaps](#)” on [page 302](#).



The slices in the Audio Part Editor. Here, the project tempo was higher than the loop’s original tempo – the slice events overlap.

Setting hitpoints manually

If you cannot get the desired result by adjusting the sensitivity, try to set and edit hitpoints manually.

Proceed as follows:

1. Zoom in on the waveform at the point where you wish to add a hitpoint.
2. Select the Edit Hitpoints tool to audition the area and make sure that the start of the sound is in view.
3. Activate “Snap to Zero Crossing” on the Sample Editor toolbar.

By finding zero crossings in the waveform (positions where the amplitude is close to zero), manually added slices will not insert any clicks or pops. All hitpoints calculated by the program are automatically placed at zero crossings.

⚠ “Snap to Zero Crossing” may alter the timing. In some cases it is better to deactivate it, especially if you just want to generate a groove quantize map. However, if you create slices afterwards, auto fades are necessary.

4. Press [Alt]/[Option] so that the mouse pointer changes to a pencil tool and click just before the start of the sound. A new hitpoint appears. Manually added hitpoints are locked by default.

- If you notice that a hitpoint was either placed too far away from the start of the sound or too far into the sound, you can move it by dragging the hitpoint to the new position.

5. Audition the slices by pointing and clicking in any slice area.

The pointer changes to a speaker icon and the corresponding slice is played back from the beginning to the end.

- If you hear a single sound split into two slices you can disable an individual slice by clicking on the handle of the corresponding hitpoint.

The hitpoint handle gets smaller and its line disappears to indicate that it is disabled. To reactivate a disabled hitpoint, click on the hitpoint handle again.

- If you hear “double hits” (e.g. a snare hit being followed by a hi-hat hit within the same slice), you can add further hitpoints manually, or you can move the Sensitivity slider to the right until the hitpoint appears and lock the hitpoint by holding down [Ctrl]/[Command] or [Shift] and clicking on its handle.

Locked hitpoints are displayed in a darker color. After locking the hitpoint you can drag the sensitivity slider to the original setting and the locked hitpoint will remain shown. You can unlock a locked hitpoint by clicking on its handle.

- If you want to delete a hitpoint, hold down [Ctrl]/[Command] and click on it. If you want to delete several hitpoints, hold down [Ctrl]/[Command] and drag a selection rectangle.

You can also hold down [Shift] and click to delete hitpoints.

Creating groove quantize maps

You can generate groove quantize maps based on the hitpoints that you have created in the Sample Editor. Groove quantizing is not meant for correcting errors, but for creating rhythmic feels. This is done by comparing your recorded music with a “groove” (a timing grid generated from the file) and moving the appropriate notes so that their timing matches the one of the groove. In other words, you can extract the timing from an audio loop and use it for quantizing MIDI parts (or other audio loops, after slicing them).

Proceed as follows:

1. Check the audio tempo and define the audio grid.
2. Create and edit hitpoints as described above.

Try to get approximately one slice per eighth note, sixteenth note, or whatever the loop requires. It can be helpful to use one of the note value-based options on the Use pop-up menu (see [“Calculating hitpoints and slicing a loop”](#) on [page 299](#)).

⇒ You do not have to create slices – just set up the hitpoints.

3. When you have finished setting the hitpoints, click the Create Groove button on the Hitpoints tab or select “Create Groove Quantize from Hitpoints” from the Hitpoints submenu of the Audio menu.

The groove is extracted.

4. If you now pull down the Quantize Type pop-up menu in the Project window you find an additional item at the bottom of the list, with the same name as the file from which you have extracted the groove.

This groove can now be selected as a base for quantizing, just like any other quantize value, see [“The quantizing functions”](#) on [page 392](#).

5. If you want to save the groove, open the Quantize Setup dialog and store it as a preset.

⇒ You can also create grooves from a MIDI part by selecting the part and dragging it on the grid display in the middle of the Quantize Setup dialog or by selecting “Part to Groove” from the Advanced Quantize submenu of the MIDI menu.

Other hitpoint functions

On the Hitpoints tab of the Sample Editor Inspector and on the various submenus of the Audio menu, you will also find the following functions:

Create Markers

If an audio event contains calculated hitpoints, you can click the Create Markers button on the Hitpoints tab to add a marker on the active marker track for each hitpoint. If your project has no marker track, it will be added and activated automatically (see [“Using markers”](#) on [page 136](#)). Markers can be useful to snap to hitpoints, e.g. for locating hitpoints and for using the Time Warp tool (see [“The Time Warp tool”](#) on [page 459](#)).

Create Regions

If your audio event contains calculated hitpoints, you can click the Create Regions button on the Hitpoints tab to automatically create regions from hitpoints. This can be useful to isolate recorded sounds.

Create Events

When you wish to create separate events according to the hitpoints for a file, you can click the Create Events button on the Hitpoints tab and use any method you like to set hitpoints.

⇒ The created slices are shown as separate events in the Project window.

Close Gaps

This function from the Advanced submenu of the Audio menu is useful if you have sliced a loop for tempo changes and you change the project tempo. Lowering the project tempo below the loop's original tempo creates gaps between the slices – the slower the tempo, the wider the gaps. Increasing the project tempo over the loop's original tempo compresses the slices using the time stretch function and creates overlaps. In both cases, you can use the Close Gaps function.

Proceed as follows:

1. Set the desired tempo.
2. In the Project window select the part containing the slices.
3. From the Advanced submenu of the Audio menu select “Close Gaps”.

Time stretch is applied to each slice to close the gaps. Depending on the length of the part and the algorithm set in the Preferences dialog (Editing–Audio page), this can take a while.

4. The waveform is redrawn and the gaps are closed!

If you open the Pool, you will see that new clips were created, one for each slice.

If you decide to change the tempo again after using the Close Gaps function, undo the Close Gaps operation or start over again, using the original, unstretched file.

⇒ In the Audio Part Editor or Project window you can also use Close Gaps on audio events. This will stretch the audio event to the start position of the next event.

VariAudio

With the AudioWarp features, editing audio in the time domain has become significantly easier. However, editing pitch was limited to having just one single numeric “transpose” value per event or part.

VariAudio offers completely integrated vocal editing and pitch alteration of individual notes in monophonic vocal recordings and can solve intonation and timing problems with only a few mouse clicks. It was developed and optimized specifically to be used with monophonic vocal recordings. Though the detection and stretching of notes of

other monophonic audio recordings, such as those of a saxophone, may work well, the quality of the end result depends greatly on the generic condition and structure of the recording's texture.

And how does it work? First, the vocal line is analyzed and split into segments shown as graphic representation of the notes sung. After the detection process is complete, the recognized notes can be modified entirely “non-destructively” so that any modifications to the audio material can be undone.

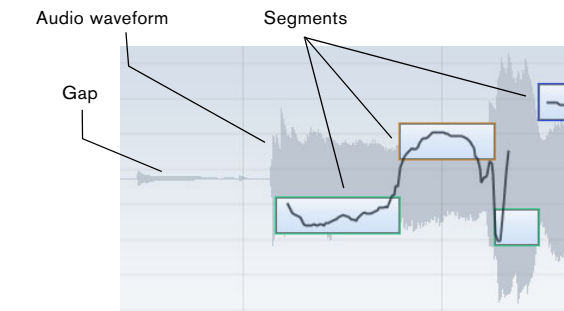
VariAudio allows you to change your audio on the vertical axis (see “[Changing the pitch](#)” on [page 306](#)) and on the horizontal axis (see “[Warping segments](#)” on [page 309](#)).

Understanding the waveform display in VariAudio

When you open monophonic vocal recordings in the Sample Editor and activate the Segments or the Pitch & Warp tool on the VariAudio tab, your audio is analyzed and segmented to display the tonal portions, i.e. the notes sung or played. This process is called segmentation. The segmentation allows you to easily associate the audio with your lyrics and to introduce pitch and timing changes.



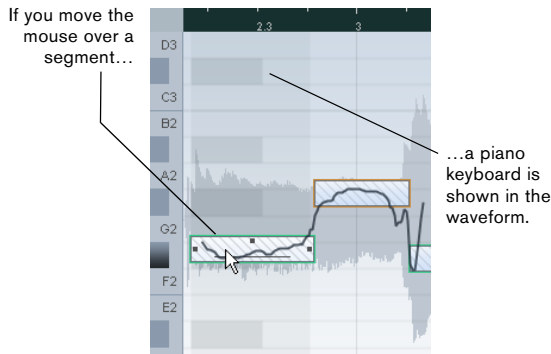
In between the different segments you may find gaps where non-tonal portions have been detected. Such gaps can be caused by non-tonal portions of the audio, e.g. breath sounds.



At the beginning of the waveform, you can see a gap where no segment is shown.

⇒ The audio waveform displayed on the VariAudio tab is always shown as mono, even if you have opened a stereo or multi-channel file.

The vertical position of a segment indicates its average pitch. If the Pitch & Warp tool is active and you move the mouse pointer over a segment, a piano keyboard is displayed, showing the found pitches.



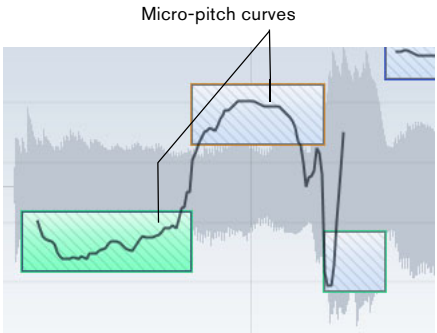
Furthermore, if you move the mouse pointer over a segment and the zoom factor is high enough, the average pitch – note name and fine tuning in cent steps (100ths of a semitone) – is shown on top of the segment. When you select a segment, this is also shown in the info line.



Note pitches represent the perceived fundamental frequency of a sound. The note A4 is perceived to be of the same pitch as a sine wave of 440Hz. The notation of pitches is a logarithmic frequency scale. The table below shows the relation between pitch (note name) and frequency in Hz:

C4	C#4/ Db4	D4	D#4/ Eb4	E4	F4	F#4/ Gb4
261.63	277.18	293.66	311.13	329.63	349.23	369.99
G4	G#4/ Ab4	A4	A#4/ Bb4	B4	C5	
392.00	415.30	440.00	466.16	493.88	523.25	

The average pitch of a segment is calculated from its micro-pitch curve. Micro-pitch curves represent the progression of the pitch for the tonal portion of the audio.



The horizontal position of a segment indicates the time position and the length.

You can navigate through the segments by using the left/right arrow keys on your computer keyboard.

You can zoom in on the segments that you want to edit by holding down [Alt]/[Option] while drawing a selection rectangle. To zoom out hold down [Alt]/[Option] and click in an empty area of the waveform. If you hold down [Alt]/[Option] and double click in an empty area, the display will be zoomed out to show all segments.

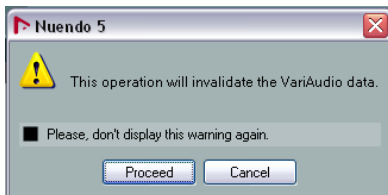
Applying editing, offline processes, and VariAudio

The following offline processes and edits that affect the length of the audio file may lead to the reanalysis of the audio material:

- Options on the Select Process menu, on the Process tab of the Sample Editor Inspector, or in the Process submenu of the Audio menu that can be applied to selections.
- Effect processing using the options on the Select Plug-in menu on the Process tab of the Sample Editor Inspector or in the Plug-ins submenu of the Audio menu (see the chapter [“Audio processing and functions”](#) on [page 263](#)).
- Cut, paste, and delete (see [“Editing selection ranges”](#) on [page 290](#)), or drawing notes (see [“Drawing in the Sample Editor”](#) on [page 292](#)).

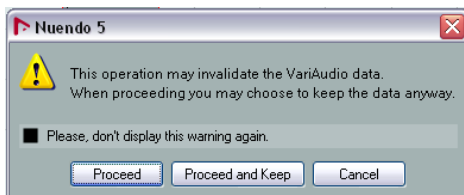
⚠ Because of the reanalysis any existing VariAudio data becomes invalid. Therefore, you should always apply offline processing or edits before using the VariAudio features.

If you apply editing that affects the audio itself (like cutting portions, etc.) to a file containing VariAudio data, the following warning message is displayed:



- If you click “Proceed”, your edits are applied and you will lose your VariAudio data. Click “Cancel” to return to your audio file without applying any changes.

If you apply offline processing to a file containing VariAudio data, the following warning message is displayed:



- If you click “Proceed”, your edits are applied, and you will lose your VariAudio data. Click “Cancel” to return to your audio file without applying any changes.

- If you click “Proceed and Keep”, your edits are applied. Any VariAudio data in the audio file is kept.

Offline processes that may not affect existing VariAudio data are Envelope, Fade In/Out, Normalize, or Silence.

- If you activate the “Please don’t display this warning again” option in one of these warning dialogs before proceeding, Nuendo will always proceed with the selected option.

You can reactivate the warning messages by deactivating the “Inhibit warning when changing the Sample Data” or “Inhibit warning when applying Offline Processes” options in the Preferences dialog (VariAudio page).

Segments mode

If you activate Segments mode on the VariAudio tab, your audio file is analyzed and split into separate segments.

- ⚠ Due to the data gained during this process, the audio and thus the size of your project can increase. Furthermore, the analysis of long audio files might take some time.

When you want to change the pitch of audio that includes non-tonal portions, e.g. consonants or effect sounds like reverberation, you may have to edit the segmentation in order to include the non-tonal portions in the segments. Otherwise, pitch modifications will only affect the tonal portions.

Editing the segmentation includes changing the start and end position of a segment, cutting or gluing segments, and moving or deleting them. Just select the section of the file that you want to change, activate Segments mode, and edit the segmentation for the desired section. If you are not satisfied with your changes, you can go back to the original segmentation (see [“Reset”](#) on [page 311](#)).

- ⚠ Editing the segmentation always leads to a recalculation of the segment’s pitch. Therefore, it is recommended that you edit the segmentation before changing the pitch.

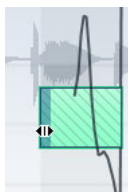
⇒ In Segments mode, the segments are shown with a hatched background. You can toggle between “Pitch & Warp” and “Segments” mode (see [“Pitch & Warp tool”](#) on [page 306](#)) by pressing the [Tab] key.

The following paragraphs list the corrections that can be performed when Segments mode is activated.

Changing the note start or end point

If you find that a note starts or ends too early or too late, e.g. when the reverb of a note or a consonant is not included in the segment, proceed as follows:

1. On the VariAudio tab activate Segments mode.
2. To change the length of a segment, move the mouse pointer over the start/end of the segment.
The mouse pointer becomes a double arrow.



3. Click and drag the segment start/end to the left or right.
The segment length changes accordingly. As the average pitch is recalculated, the segment may jump upwards or downwards. Snap will not be taken into account.

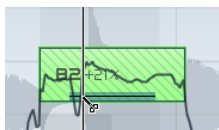
⚠ If the resulting segment pitch cannot be calculated because of an increase in non-tonal data, the segment will be deleted.

⇒ You can drag the segment start/end only until it reaches the start/end of the next segment. Segments cannot overlap each other.

Cutting a segment

If you notice that a segment includes more than one note, proceed as follows:

1. On the VariAudio tab activate Segments mode.
2. Move the mouse pointer over the lower border of the segment that you would like to cut.
The mouse pointer becomes a scissor.



3. Click at the desired position to cut the segment.
The segment is cut accordingly taking Snap into account.

⚠ When the resulting segment pitch cannot be calculated because of an increase in non-tonal data, the segment will be deleted.

⇒ There is a minimum size for a segment. Very short segments cannot be cut.

Gluing segments

⚠ We recommend to correct the segmentation before pitching. If you glue together segments after changing the pitch (this includes manual pitch modifications, Quantize Pitch, and Straighten Pitch), your modifications are reset and the original pitch will be heard.

If you notice that a single note is spread over two segments, proceed as follows:

1. On the VariAudio tab activate Segments mode.
2. Hold down [Alt]/[Option] and move the mouse pointer over the segment that you want to glue to the next.
The mouse pointer becomes a glue tube.



3. Click to glue the active segment to the next segment.
If several segments are selected, they are all glued together. Snap is not taken into account.

⚠ If the resulting segment pitch cannot be calculated because of an increase in non-tonal data, the segment will be deleted.

Moving segments horizontally

After cutting a segment it may be necessary to move segments horizontally, for example, if you notice that a note is at the wrong position. Proceed as follows:

1. On the VariAudio tab activate Segments mode.
2. Move the mouse pointer over the upper border of the segment.

The mouse pointer becomes a double arrow.



3. Click and drag the whole segment to the left or right. The segment is moved accordingly. If several segments are selected, they are all moved together. Snap is not taken into account.

⚠ If the resulting segment pitch cannot be calculated because of an increase in non-tonal data, the segment will be deleted.

⇒ You can only drag the segment start/end until it reaches the start/end of the next segment. Segments cannot overlap each other.

Deleting segments

Sometimes it might be useful to delete segments. This is the case in situations where you want the original audio to be played back, e.g. for non-tonal portions or consonants.

- You can delete segments by selecting them in Segments mode and pressing [Backspace].

Saving the segmentation

The corrected segmentation is saved with the project, no additional saving is required.

Pitch & Warp tool

If you activate the Pitch & Warp tool on the VariAudio tab, you can change the pitch and the timing of your audio.

⚠ Before changing the pitch or timing of your segments, make sure that the segments you want to change are correct (see “Segments mode” on page 304).

You can edit the pitch and timing of audio segments for corrective purposes but also creatively. VariAudio allows you to experiment freely with note pitches in order to change the melody with or without preserving a natural sound. Furthermore, you can change the timing of the audio.

⇒ In Pitch & Warp mode, the segments are shown with a plain background. You can toggle between “Pitch & Warp” and “Segments” mode by pressing the [Tab] key.

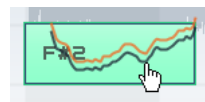
⇒ There are some restrictions concerning the highest and lowest possible note pitch. You cannot choose note pitches above C5 and below E0.

Changing the pitch

If you want to edit the pitch of a segment, proceed as follows:

1. On the VariAudio tab activate the Pitch & Warp tool.
2. Move the mouse pointer over the segment.

The mouse pointer becomes a hand symbol to indicate that you can change the pitch of the segment. If the zoom factor is high enough, a tooltip indicates the found note pitch and the segment's deviation from this pitch in percent.



There are three different modes that affect the way in which a note will snap to a certain pitch that can be accessed using the following modifier keys:

Option	Description	Default modifier
Absolute Pitch Snapping	Pitches the segment to the next semitone.	None
Relative Pitch Snapping	Snaps the segment in relation to its current deviation in cents, i.e. if the segment has a pitch of C3 and a deviation of 22%, and you move it up by one semitone, it will be pitched to C#3 while keeping the deviation of 22%.	[Ctrl]/[Command]
No Pitch Snapping	Lets you edit the pitch freely.	[Shift]

⇒ The default modifier key can be changed in the Preferences dialog (Editing–Tool Modifier page).

3. Drag the segment up or down to the desired pitch and release the mouse. However, be careful: The more the pitch deviates from the original pitch, the less likely it is that your audio sounds natural.

If the Solo algorithm is not turned on already, a warning appears informing you that Nuendo has selected it automatically. The segment is pitched accordingly. While dragging, the original micro-pitch curve of the segment is shown in orange. If several segments are selected, they are all pitched.

You can also use the up/down arrow keys on your computer keyboard to edit the note pitches.

Proceed as follows:

- Use the up/down arrow keys to change the pitch in semitone steps.
- Hold down [Shift] while using the up/down arrow keys to change the pitch in cent steps.

⚠ If you pitch-shift audio events with the Transpose options (see “The transpose functions” on page 129) the transposition is added to the pitch modifications that you introduced with the Pitch & Warp tool, even if this is not reflected in the segmentation display.

Quantize Pitch

You can also quantize the audio pitch upwards or downwards to iteratively reduce the deviation from the nearest semitone position.

Proceed as follows:

1. Select the segments that you want to quantize.
2. Move the Quantize Pitch slider to the right.

The selected segments are quantized iteratively.

You can set up a key command for Quantize Pitch in the Sample Editor category of the Key Commands dialog (see “Key commands” on page 580). When using the key command, the segments are directly quantized to the next semitone position.

Tilting the micro-pitch curve

Sometimes changing the pitch of the whole note segment is not enough. In these cases you will have to modify how the pitch changes inside the segment. This is indicated by the micro-pitch curve (see “Understanding the waveform display in VariAudio” on page 302).

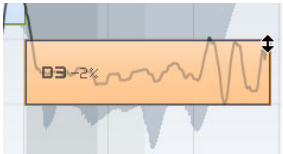
⚠ The micro-pitch curve displays the progression of the pitch for the tonal portion of the segment. For non-tonal portions of the audio, micro-pitch curves cannot be shown.

Proceed as follows:

1. On the VariAudio tab, activate the Pitch & Warp tool.
2. To change the micro-pitch of a segment, move the mouse pointer over the top left/right corner of the segment. The mouse pointer becomes an up/down arrow.
3. Drag upwards/downwards with the mouse to change the micro-pitch curve.



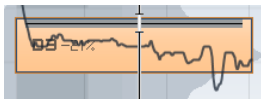
If the pitch falls at the end of the segment...



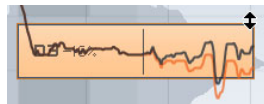
...activate the Pitch & Warp tool, point at the top right corner and drag upwards.

If you want to change the pitch modulation only for the segment start or end, you can set an “anchor point” to specify which part of the segment is affected. Proceed as follows:

1. Move the mouse pointer over the top border of the segment.
The mouse pointer becomes an I-beam symbol.
2. Click at the position where you want to set an anchor.
A vertical line appears at the position where you clicked. A segment can only have one anchor.
3. Move the mouse pointer over the top left/right corner of the segment and drag upwards or downwards to tilt the micro-pitch curve.
The modulation curve is only changed from the segment border to the anchor.

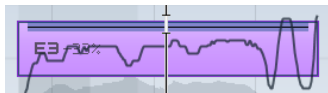


Move the mouse over the top border and click to set an anchor...



...if you only want to compensate for the descending pitch at the end of the segment.

- If you press [Alt]/[Option] while dragging up/down, the tilt anchor is used as an axis around which the micro-pitch curve can be rotated.



If you set a tilt anchor...



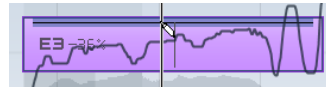
...and press [Alt]/[Option], the mouse pointer becomes a diagonal arrow...



...to indicate that you can rotate the micro-pitch curve.

4. Repeat the steps above to set anchors and tilt the micro-pitch curve until you are satisfied with the result.

- If you want to remove a tilt anchor from a segment, hold down [Alt]/[Option], position the mouse pointer at the top border of the segment until it turns to a glue tube, and click. The tilt anchor is deleted.



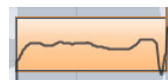
Straighten Pitch

If you want to compensate for the rise and fall of notes, i.e. the deviation of the micro-pitch curve from the representative pitch, you can use the Straighten Pitch slider. This correction comes in handy when a note is played flat (pitch rises) or sharp (the pitch falls) at the end. Proceed as follows:

1. Select the segments whose pitch you want to straighten.
2. Move the Straighten Pitch slider to the right.
The pitch of the selected segments is straightened.



This micro-pitch looks a bit off. By moving the Straighten Pitch slider to the right...



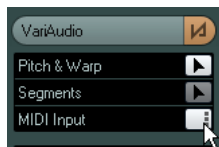
...the micro-pitch curve is straightened.

MIDI Input

You can change the pitch on the fly by selecting the segment you want to change and pressing a key on your MIDI keyboard or using the Virtual Keyboard (Nuendo Expansion Kit only – see [“The Virtual Keyboard \(Nuendo Expansion Kit only\)”](#) on page 89).

Proceed as follows:

1. After having corrected the segmentation, select the segment for which you would like to change the pitch.
2. Activate the Pitch & Warp tool and click the MIDI Input button.



3. Press a key on your MIDI keyboard or use the Virtual Keyboard (Nuendo Expansion Kit only) to change the pitch of the segment.

The pitch of the segment changes according to the note you play.

The MIDI Input function has two modes: Still mode and Step mode. You can switch between them by [Alt]/[Option]-clicking on the MIDI Input button:

- In Still mode you can select individual segments by clicking on them and change their pitch by pressing a MIDI key. You can also select several segments and press a MIDI key to change the pitch of several segments simultaneously. The pitch of the first selected segment is changed to the pitch of the MIDI note you play. The pitches of the other selected segment are changed by the same amount.



Still mode is activated for MIDI Input.

- In Step mode you can step through the segments by selecting the first segment that you would like to change and pressing a MIDI key. The next segment will automatically be selected afterwards. This allows you to work in a more creative way, for example, to develop completely new melody lines via MIDI.



Step mode is activated for MIDI Input.

4. When you are done, deactivate the MIDI Input button.

⇒ MIDI controller data like pitchbend or modulation are ignored.

Warping segments

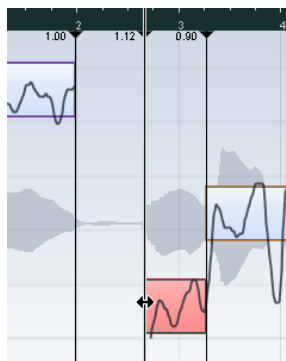
⚠ Any correction of the segmentation must be applied before warping segments.

Time correction, i.e. warping at segment level, is useful if you want to align a musical accent to a certain position, or change or quantize the timing of single segments in monophonic vocal recordings. When warping audio segments, warp tabs will be created. These are shown on the VariAudio and the AudioWarp tabs of the Sample Editor Inspector. (For information on warping complete audio files, see [“Free Warp”](#) on [page 297](#).)

To warp a segment, proceed as follows:

1. On the VariAudio tab activate the Pitch & Warp tool.
2. To change the timing of a segment, move the mouse pointer over the start/end of the segment. The mouse pointer becomes a double arrow and the warp tabs are displayed in the ruler.
3. Drag the start/end of the segment to the desired position.

If the Snap button is activated, the segment border will snap to the grid. When you drag the segment border, warp tabs are shown not only at the border but also at the adjacent segment borders to indicate which portions of the audio are stretched/affected.



⇒ Warping a segment will also change the timing of the adjacent segments.

⇒ Timing modifications introduced this way will not adapt to the project tempo. If this is what you want, use Musical Mode (see [“AudioWarp: Tempo matching audio”](#) on [page 293](#)).

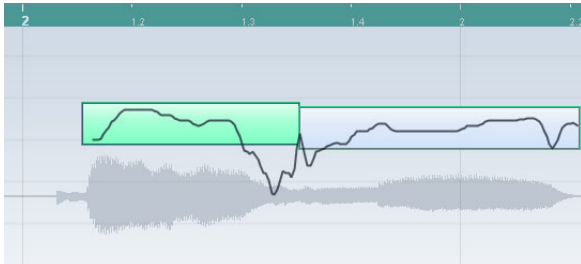
- You can change the insert position of a warp tab in the audio by clicking and dragging the warp tab handle in the ruler. This will change the warping (see [“Editing Warp tabs”](#) on [page 310](#)).
- Hold down [Shift] (by default) to delete warp tabs. To delete a warp tab, hold down the tool modifier so that the pointer becomes an eraser and click on the warp handle.
- If you are not satisfied with your changes, you can revert the timing of the selected segments by choosing the “Warp Changes” option from the Reset pop-up menu (see [“Reset”](#) on [page 311](#)).

Editing Warp tabs

In some cases the beginning of the waveform does not correspond to the beginning of a segment, e.g. when the audio starts with non-tonal portions like breath sounds (see [“Understanding the waveform display in VariAudio”](#) on [page 302](#)). But when it comes to warping, any changes you wish to make must affect the waveform as a whole.

You can of course change the segmentation to achieve this, but if you want to pitch your audio afterwards, this would affect also any non-tonal portions of the audio. If this is not what you want, proceed as follows:

1. Activate the Pitch & Warp tool and activate the Snap button.



In this example the beginning of the segment does not correspond to the beginning of the waveform.

2. Move the mouse pointer over the start of the segment so that it becomes a double arrow and drag the segment start to the beginning of the bar.

The segment border snaps to the grid at the exact bar position.



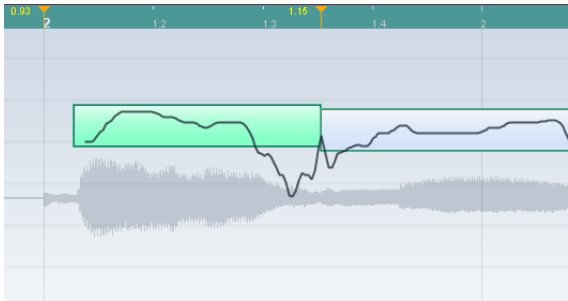
Now the beginning of the segment matches the beginning of the bar, but we want the beginning of the waveform to match the beginning of the bar:

3. Point at the warp handle displayed in the ruler so that it turns into a double arrow and drag it to the beginning of the waveform.

The background is displayed in orange to indicate which part of the waveform is affected by the change.



Now the beginning of the waveform matches the desired bar position.



Editing warp tabs can also be useful if you change the length of a segment that you have already warped. In this case, editing warp tabs can help you synchronize your audio again.

Reset

This pop-up menu at the bottom of the VariAudio tab allows you to reset the modifications you performed with the Pitch & Warp tool. It also lets you reset the changes you made in Segments mode by reanalyzing the audio and returning to the original segmentation. The following options are available:

Function	Description
Pitch Changes	If you select this option, pitch changes including micro-pitch modifications with the Tilt Micro Pitches tool are reset either for the selected segments (if available) or for the whole file.
Warp Changes	If you select this option, warp changes are reset.
Pitch + Warp Changes	If you select this option, pitch, micro-pitch, and warp changes are reset either for the selected segments (if available) or for the whole file.
Reanalyze Audio	If you select this option, the audio is reanalyzed and all your segmentation changes are reset.

⇒ You can set up key commands for the reset and the re-analyze function in the Sample Editor category of the Key commands dialog (see “Key commands” on page 580).

Listening to your modifications

You can listen to the results of your modifications using the following methods:

- By activating Acoustic Feedback on the toolbar. The segments are played back so that you can easily audition your pitch modifications while editing.
- By using the Play tool on the toolbar.
- By using the Audition and the Audition Loop tool on the toolbar.
- By using cycle playback in the Project window.

If you want to compare the original to the modified audio (i.e. hear the audio without pitch or warp modifications), you have the following possibilities:

- You can disable your pitch modifications by clicking the Disable Pitch Changes button on the VariAudio tab or by setting up and using the “VariAudio - Disable Pitch Changes” key command in the Key Commands dialog, Sample Editor category (see “Key commands” on page 580).
- You can disable your warp modifications by clicking the Disable Warp Changes button on the AudioWarp tab or by setting up and using the “VariAudio – Disable Warp Changes” key command in the Key Commands dialog, Sample Editor category (see “Key commands” on page 580).

Functions – Extract MIDI...

This function extracts a MIDI part from your audio. This is useful, if you have an audio event with a voice you like and you want to create an identical second voice with a MIDI instrument. The extracted MIDI part can then be used to print out notes from within the Score Editor (Nuendo Expansion Kit only) or to export it as a MIDI file (see “Exporting and importing standard MIDI files” on page 560).

⇒ Before extracting MIDI from your audio you should correct the segmentation. Otherwise, you will have to correct segmentation errors later in the MIDI part. Transition changes, tilting the micro-pitch curve, Quantize Pitch, and pitch corrections will also be taken into account.

The result depends on the quality and the characteristics of your audio.

Proceed as follows:

1. Open the VariAudio tab.
2. Open the Functions pop-up menu and select “Extract MIDI...”.

The “Extract MIDI” dialog opens.

3. Select an extraction mode in the corresponding pop-up menu to include or exclude pitchbend events.

Pitchbend events are MIDI controller data that is saved in a MIDI file and that creates pitch transitions between MIDI notes. The following options are available:

Option	Description
Just Notes and no Pitchbend Data	If you select this option, only notes will be included in the MIDI part.
Notes and Static Pitchbend Data	If you select this option, a pitchbend event will be created for every segment. Select a pitchbend value from 1 to 24 in the Pitchbend Range field. When you are working with an external MIDI controller, it might be necessary to set it to the same value.
Notes and Continuous Pitchbend Data	If you select this option, pitchbend events that correspond to the micro-pitch curve will be created. Select a pitchbend value from 1 to 24 in the Pitchbend Range field. The setting should correspond to the same value on your MIDI controller or the VST instrument being controlled. Note that although the graphic representation of the pitchbend curve is smoothed, all pitchbend data is included.

4. Open the Destination pop-up menu and select an option to decide where the MIDI part will be placed.

The following options are available:

Option	Description
First Selected Track	If you select this option, the MIDI part will be placed on the first selected MIDI or instrument track. Note that any MIDI parts from previous extractions that are on this track will be deleted.
New MIDI Track	If you select this option, a new MIDI track will be created for the MIDI part.
Project Clipboard	If you select this option, the MIDI part is copied to the clipboard so that you can insert it at the desired position on a MIDI or instrument track in the Project window.

⇒ If you have opened the Sample Editor from the Pool and the audio file does not form part of your project, the MIDI part will be inserted at the Project start position.

5. Click OK.

A MIDI part is created.

⇒ If your audio event references only a section of the audio clip, only this range will be extracted.

You can also use a key command to extract your audio as MIDI. In this case no dialog opens and the settings that were used for the previous extraction are used instead. For further information on how to set up key commands, please refer to the chapter “[Key commands](#)” on [page 580](#).

Flattening realtime processing

You can “flatten” realtime processing at any time. This can be done to serve two purposes: to reduce the CPU load and to optimize the sound quality of the processing. The flatten function takes the following into account:

- Warp modifications (see “[Free Warp](#)” on [page 297](#) and “[Warping segments](#)” on [page 309](#)), even when Bypass is activated. After the flattening, your Warp tabs will be lost. However, you can undo this function as usual.
- VariAudio pitch modifications (see “[Changing the pitch](#)” on [page 306](#)), even when Bypass is activated. In this case, the Realtime algorithm (Solo preset) will be used. After the flattening, your VariAudio data will be lost. However, you can undo this operation.
- Event transpose (see “[Transposing individual parts or events using the info line](#)” on [page 133](#)).
- Select the audio event(s) that you want to process and select “Flatten” from the Realtime Processing submenu of the Audio menu.

Also use this function before applying any offline processing. When the flatten processing is applied, a copy of the original file is automatically created in the Pool so that the original audio clip remains intact.

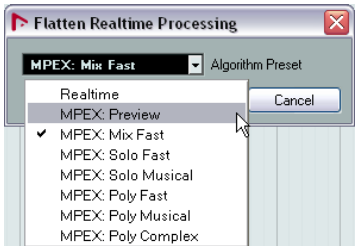
Selecting an algorithm for the flattening

When you flatten the realtime processing, you can use the MPEX 4 algorithm to process the audio, which may produce better sound quality than the realtime processing. Apart from offline processing, this is the only way to achieve polyphonic formant conserving pitch shifting.

Proceed as follows:

1. Select the audio event(s) you wish to process.
2. Select “Flatten” from the Realtime Processing submenu of the Audio menu or use the corresponding button on the Process tab.

If you did not perform any pitch modifications, a dialog opens where you can select an algorithm for the processing. You can either select the MPEX 4 algorithm, which will produce the highest sound quality, or the Realtime algorithm which is much quicker but will not improve the audio quality of the processing (although it will reduce the CPU load).



⇒ This dialog will not open when the time stretching factor is outside the range of 0.5 and 2 or when you introduced VariAudio pitch modifications. In these cases the Realtime algorithm will be used.

For the MPEX 4 algorithm the following quality settings are available:

Option	Description
Preview	Use this mode only for preview purposes.
Mix Fast	This mode is a very fast mode for preview. This works best with composite music signals (mono or stereo material).
Solo Fast	Use this mode for single instruments (monophonic material) and voice.
Solo Musical	Same as above but higher quality.
Poly Fast	Use this for processing monophonic and polyphonic material. This is the fastest setting that gives still very good results. You can use this for drum loops, mixes, chords.
Poly Musical	Use this for processing monophonic and polyphonic material. This is the recommended MPEX default quality setting. You can use this for drum loops, mixes, chords.
Poly Complex	This high quality setting is quite processor intense and should be used only when processing difficult material or for stretch factors above 1.3.

The Realtime presets can be selected from the Algorithm pop-up on the Sample Editor toolbar, see [“Selecting an algorithm for realtime playback”](#) on [page 296](#).

3. Select an algorithm preset and click OK.

After the processing, any loop that was previously stretched in realtime or had been pitch shifted will play back exactly the same, but Musical Mode will be deactivated and the realtime pitch shifting will be set to 0.

The audio clip is now like any standard audio clip before applying realtime processing, i.e. it does not follow tempo changes. The flattening processing function is best used when you have determined the tempo or key of a project, but you can of course always adapt the audio to a new key or tempo. In this case, it is better to revert to the original audio clip rather than to process the already processed file again.

Unstretching audio files

By selecting “Unstretch Audio” from the Realtime Processing submenu of the Audio menu, all realtime time stretching (by sizing or by warp tabs) is removed.

⇒ Note that realtime transpose (in the info line) and Musical Mode will not be removed by this.

Whether the “Unstretch Audio” menu item is available depends on whether the time stretching has been applied at event or clip level:

- If you have sized an audio event in the Project window using “Sizing Applies Time Stretch” (see [“Resizing events using time stretch”](#) on [page 73](#)), you can undo the time stretching by selecting the event in the Project window and then applying “Unstretch Audio”. This removes all time stretching and warp tabs.
- When you have entered a tempo and/or length on the toolbar, this information is saved for the source clip. These changes cannot be undone using “Unstretch Audio”.

Background

The Audio Part Editor allows you to view and edit the events inside audio parts. Essentially, this is the same type of editing that you do in the Project window, which means that this chapter contains a lot of references to the chapter “Working with projects” on [page 51](#).

Audio parts are created in the Project window in one of the following ways:

- By selecting one or several audio events on the same track, and selecting “Events to Part” from the Audio menu.
- By gluing together two or more audio events on the same track with the Glue Tube tool.
- By drawing an empty part with the Pencil tool.
- By double-clicking between the left and right locators on an audio track.

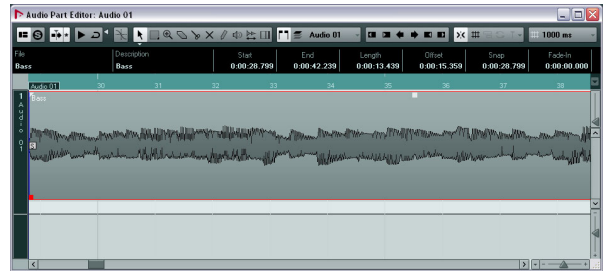
With the last two methods, an empty part is created. You can then add events to the part by pasting, or by using drag and drop from the Pool.

Opening the Audio Part Editor

You open the Audio Part Editor by selecting one or more audio part(s) in the Project window and double-clicking on any one of them (or using the Edit-Open key command, by default [Ctrl]/[Command]-[E]). The Audio Part Editor can display several parts at once, and you can also have more than one Audio Part Editor open at the same time.

⇒ Double-clicking on an audio event in the Project window will open the Sample Editor (see “Opening the Sample Editor” on [page 284](#)).

Window overview



The toolbar

The tools, settings, and icons on the toolbar have the same functionality as in the Project window, with the following differences:

- A Solo button (see “Auditioning” on [page 317](#)).
- Separate tools for auditioning (Speaker) and scrubbing (see “Scrubbing” on [page 317](#)).
- No Line, Glue Tube or Color tools.
- Play and Loop icons and an Audition Volume control (see “Auditioning” on [page 317](#)).
- Independent Track Loop settings (see “The independent track loop function” on [page 317](#)).
- Part List controls for handling several parts: activating parts for editing, restricting editing to active parts only and showing part borders (see “Handling several parts” on [page 318](#)).

⇒ You can customize the toolbar by hiding or reordering its items, see “Using the Setup options” on [page 572](#).

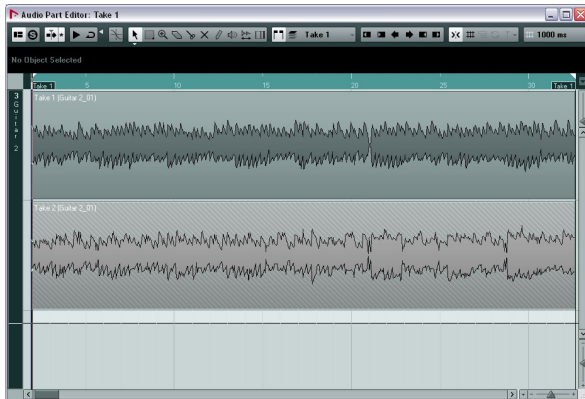
The ruler and info line

These have the same functionality and appearance as their counterparts in the Project window.

- You can select a separate display format for the Audio Part Editor ruler by clicking on the arrow button on the right and selecting an option from the pop-up menu. For a list of the available formats, see “The ruler” on [page 47](#).

About lanes

If you make the editor window larger, this will reveal additional space below the edited events. This is because an audio part is divided vertically in lanes.



Lanes can make it easier to work with several audio events in a part. Moving some of the events to another lane can make selection and editing much easier.

- To move an event to another lane without accidentally moving it horizontally, press [Ctrl]/[Command] and drag it up or down.

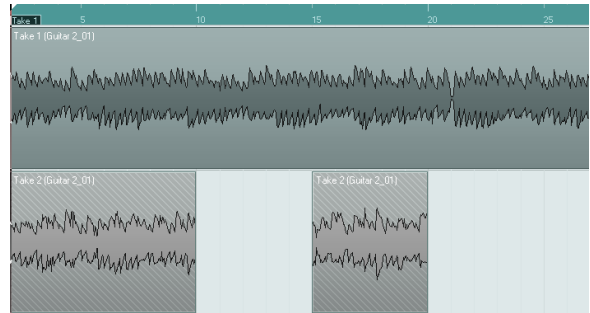
Overlapping events

Only one event per track can be played back at the same time! This means that if you have overlapping events (on the same lane or different lanes) these will cut each other off, according to the following rules:

- For events on the same lane, the ones that are on top (visible) will be played.

To move overlapping events to the front or back, use the Move to Front and Move to Back functions on the Edit menu.

- For events on different lanes, the event on the lowest lane gets playback priority.



The overlapping sections of the upper event will not be played because the event on the lower lane has playback priority!

Imagine the following situation: You have two overlapping audio events, with the top event audible during playback. What happens when you mute the audible event?

- By default, you will not hear the overlapped event when muting an event that has playback priority over another event.

This default behavior ensures that you do not suddenly hear audio events that previously were not part of your mix.

- In the Preferences dialog (Editing–Audio page) you will find the “Treat Muted Audio Events like Deleted” option. When you activate this option, any events overlapped by a muted event will become audible.

Operations

- ⚠ Zooming, selecting and editing in the Audio Part Editor are done just as in the Project window (see the chapter “[Working with projects](#)” on [page 51](#)).

- Note that if a part is a shared copy (i.e. you have previously copied the part by [Alt]/[Option]-[Shift] and dragging), any editing you perform will affect all shared copies of this part.

To indicate that it is a shared copy, a symbol is displayed in the part in the Project window (see “[Aligning events](#)” on [page 69](#)).

Auditioning

There are several ways to listen to the events in the Audio Part Editor:

By using the Speaker tool

If you click somewhere in the editor's event display with the Speaker tool and keep the mouse button pressed, the part will be played back from the position where you clicked. Playback will continue until you release the mouse button.

By using the Audition icon



The Audition and Audition Loop icons

Clicking the Audition icon on the toolbar plays back the edited audio, according to the following rules:

- If you have selected events in the part, only the section between the first and last selected event will be played back.
- If you have made a range selection, only this section will be played back.
- If there is no selection, the whole part will be played back. If the project cursor is within the part, playback starts from the current cursor position. If the cursor is outside the part, playback starts from the beginning of the part.
- If the Audition Loop icon is activated, playback will continue until you deactivate the Audition icon. Otherwise, the section will be played back once.
- When auditioning with the Speaker tool or Audition icon, audio will be routed directly to the Control Room or to the Main Mix (the default output bus) if the Control Room is disabled.

By using regular playback

You can of course use the regular playback controls while in the Audio Part Editor. Furthermore, if you activate the Solo Editor button on the toolbar, only the events in the edited part will be played back.

Using key commands

If you activate the “Playback Toggle triggers Local Preview” option in the Preferences dialog (Transport page), you can start/stop auditioning by pressing [Space]. This is the same as clicking the Audition icon on the toolbar.

⇒ The Audio Part Editor also supports the key commands “Preview start” and “Preview stop” in the Media category of the Key Commands dialog. These key commands stop the current playback, no matter if you are in normal playback or in audition mode.

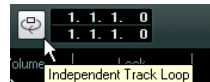
The independent track loop function

The independent track loop is a sort of “mini-cycle”, affecting only the edited part. When the loop is activated, the events in the parts that are within the loop will be repeated continuously and completely independent – other events (on other tracks) are played back as usual. The only “interaction” between the loop and the “regular playback” is that the loop starts every time the cycle starts over again.

To set up the independent track loop, proceed as follows:

1. Turn on the loop by clicking the Independent Track Loop button on the toolbar.

If it is not visible, right-click the toolbar and add the Independent Track Loop Settings section – see “Using the Setup options” on page 572.



When the loop is activated, the cycle is not shown in the editor's ruler. Now you need to specify the length of the loop:

2. [Ctrl]/[Command]-click in the ruler to set the start and [Alt]/[Option]-click to set the end of the loop.

You can also edit the loop start and end positions numerically in the fields next to the Loop button.

The loop is indicated in purple in the ruler.

⇒ The events will be looped as long as the Loop button is activated and the Audio Part Editor window is open.

Scrubbing

In the Audio Part Editor, the Scrub tool has a separate icon on the toolbar. Apart from that, scrubbing works exactly as in the Project window (see “Scrubbing audio” on page 67).

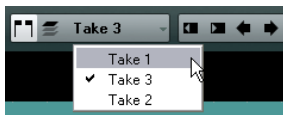
Handling several parts

When you open the Audio Part Editor with several parts selected – all on the same track or on different tracks – they might not all “fit” in the editor window, which can make it hard to get an overview of the different parts when editing.

Therefore, the toolbar features a few functions to make working with multiple parts easier and more comprehensive:

- The Part List menu lists all parts that were selected when you opened the editor, and lets you select which part is active for editing.

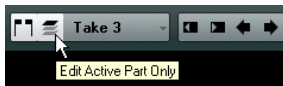
When you select a part from the list, it is automatically made active and centered in the display.



⇒ Note that it is also possible to activate a part by clicking on it with the Arrow tool.

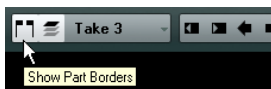
- The button “Edit Active Part Only” lets you restrict editing operations to the active part only.

If you for example select “All” from the Select submenu of the Edit menu with this option activated, all events in the active part will be selected but not the events in other parts.



“Edit Active Part Only” activated on the toolbar

- You can zoom in on an active part so that it fills the screen by selecting “Zoom to Event” from the Zoom submenu of the Edit menu.
- The button “Show Part Borders” can be used if you want to see clearly defined borders for the active part. When this is activated, all parts except the active one are grayed out, making the borders easily discernible. There are also two “markers” in the ruler with the name of the active part, marking its beginning and end. These can be moved freely to change the part borders.



“Show Part Borders” activated on the toolbar

- It is possible to cycle between parts, making them active using key commands.

In the Key Commands dialog – Edit category, there are two functions: “Activate Next Part” and “Activate Previous Part”. If you assign key commands to these, you can use them to cycle between parts. See [“Setting up key commands”](#) on [page 581](#) for instructions on how to set up key commands.

Common methods

Assembling a “perfect take”

When you record audio in Cycle mode, either an event or a region (or both) is created for each recorded lap (see [“Recording audio in cycle mode”](#) on [page 99](#)). These events and regions are named “Take X”, where “X” is the number of the take. You can create a perfect take by putting together sections of the different takes in the Audio Part Editor.

⇒ The procedure below will not work if you recorded with “Keep Last” mode selected on the Transport panel. In that case, only the last take will be kept on the track (although the previous takes will be available as regions in the Pool).

First, you have to create an audio part from the takes. This procedure is slightly different depending on whether you choose to create events or regions.

Creating an audio part from events

1. In the Project window, use the Object Selection tool to draw a rectangle around the recorded events. This is necessary, since clicking on the event may just select the event on top (the last take). If in doubt, check the info line – the info text must be shown in color.
 2. Pull down the Audio menu and select “Events to Part”. The events are converted to an audio part.
- Note that the events cycle record mode also makes it easy to combine different takes in the Project window – see [“Create Events mode \(Preferences\)”](#) on [page 99](#).

Creating an audio part from regions

1. In the Project window, select the event you recorded in Cycle mode.

After recording, this will play the last take.

2. Pull down the Audio menu and select “Events to Part”. You are asked whether you want to “Create part using regions”.

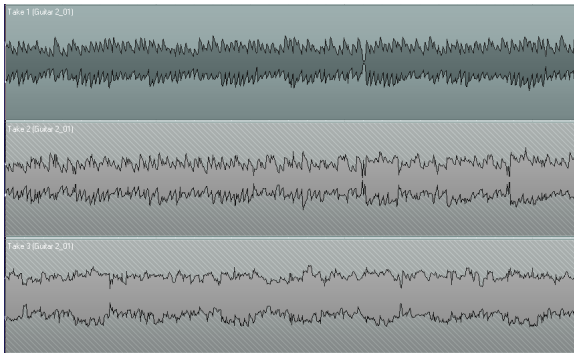
3. Click “Regions”.

The regions are converted to an audio part.

Assembling a take

1. Double-click the part to open the Audio Part Editor.

Now, the different takes will be placed on different lanes, with the last take at the bottom.



2. Use the tools to cut out pieces of the takes and assemble the final result.

This can include splitting with the Scissors tool, resizing events with the Arrow tool or deleting with the Erase tool.

- Remember that the events on the lowest lane have playback priority.

Use the Audition icon to audition the result.

3. Close the Audio Part Editor.

You have now assembled a “perfect take”!

Options and Settings

The following options and settings are available in the Audio Part Editor:

- Snap

The Snap functionality in the Audio Part Editor is exactly the same as in the Project window, see “[The Snap function](#)” on [page 48](#).

- Auto-Scroll

When Auto-Scroll is activated on the toolbar, the window will scroll during playback, keeping the project cursor visible in the editor. This setting can be activated or deactivated individually for each window.

- Snap to Zero Crossing

When this option is activated, all audio edits are done at zero crossings (positions in the audio where the amplitude is zero). This helps you avoid pops and clicks which might otherwise be caused by sudden amplitude changes.

22

The Pool

Background

Every time you record on an audio track, a file is created on your hard disk. A reference to this file – a clip – is also added to the Pool. Two general rules apply to the Pool:

- All audio and video clips that belong to a project are listed in the Pool.
- There is a separate Pool for every project.

The way the Pool displays folders and their contents is similar to the way the Mac OS X Finder and the Windows Explorer display folders and lists of files.

In the Pool you can, among other things, perform the following operations:

Operations that affect files on disk

- Importing clips (audio files can automatically be copied and/or converted)
- Converting file formats
- Renaming clips (this will also rename the referenced files on disk) and regions
- Deleting clips
- Preparing file archives for backup
- Minimizing files

Operations that only affect clips

- Copying clips
- Auditioning clips
- Organizing clips
- Applying audio processing to clips
- Saving or importing complete Pool files

Opening the Pool

You can open the Pool in any of the following ways:

- By clicking the “Open Pool Window” button on the Project window toolbar.

If this icon is not visible, you need to activate the “Media & Mixer Windows” option on the toolbar context menu first.



- By selecting “Pool” on the Project menu or “Open Pool Window” on the Media menu.
- By using a key command – by default [Ctrl]/[Command]-[P].

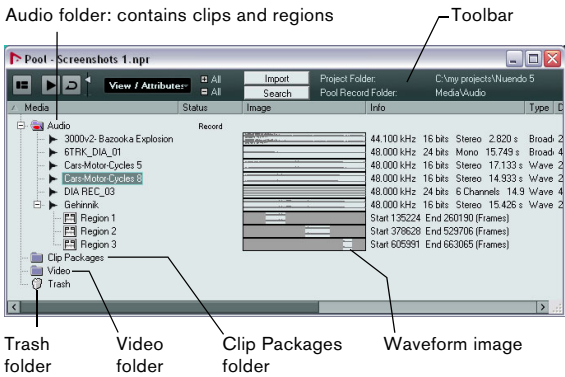
The content of the Pool is divided into the following main folders:

- The Audio folder
This contains all audio clips and regions currently in the project.
- The Clip Packages folder
This contains all imported or created clip packages.
- The Video folder
This contains all video clips currently in the project.
- The Trash folder
Unused clips can be moved into the Trash folder for later permanent removal from the hard disk.

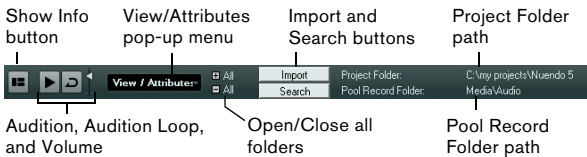
These folders cannot be renamed or deleted from the Pool, but any number of subfolders can be added (see [“Organizing clips and folders”](#) on [page 331](#)).

Window overview

Audio folder: contains clips and regions



Toolbar overview



The info line

Click the “Show Info” button on the toolbar to show or hide the info line at the bottom of the Pool window. It shows the following information:

- Audio Files – the number of audio files in the Pool
- Used – the number of audio files in use
- Total size – the total size of all audio files in the Pool
- External Files – the number of files in the Pool that do not reside in the project folder (e.g. video files)

The Pool window columns

Various information about the clips and regions can be viewed in the Pool window columns. The columns contain the following information:



Column	Description
Media	This column contains the Audio, Video and Trash folders. If the folders are opened, the clip or region names are shown and can be edited. This column is always shown.
Used	This column displays the number of times a clip is used in the project. If there is no entry in this column, the corresponding clip is not used.

Column	Description
Status	This column displays various icons that relate to the current Pool and clip status. See “About the Status column symbols” on page 322 for a description of the icons.
Musical Mode	The checkbox in this column allows you to activate or deactivate Musical Mode. If the Tempo column (see below) displays “???”, you have to enter the correct tempo before you can activate Musical Mode.
Tempo	This shows the tempo of audio files, if available. If no tempo has been specified, the column displays “???”.
Sign.	This is the time signature, e.g. “4/4”.
Key	This is the root key, if one was specified for the file.
Info	This column shows the following information for audio clips: The sample rate, bit resolution, number of channels and the length in seconds. For regions, it displays start and end times in frames, and for video clips the frame rate, number of frames, and length in seconds.
Type	This column shows the file format of the clip.
Date	This column shows the date when the audio file was last changed.
Origin Time	This column shows the original start position where a clip was recorded in the project. As this value can be used as a basis for the “Insert into Project” option in the Media or context menu (and other functions), you can change it if the Origin Time value is independent (i.e. not for regions). This can either be done by editing the value in the column, or by selecting the corresponding clip in the Pool, moving the project cursor to the new desired position and selecting “Update Origin” from the Audio menu.
Image	This column displays waveform images of audio clips or regions.
Path	This column shows the path to the location of a clip on the hard disk.
Reel Name	If you have imported an OMF file (see “Exporting and importing OMF files” on page 556), it may include this attribute, which is then shown in this column. The Reel Name describes the “physical” reel or tape from which the media was originally captured.

About the Status column symbols

The Status column can display various symbols that relate to the clips status. The following symbols can be shown:

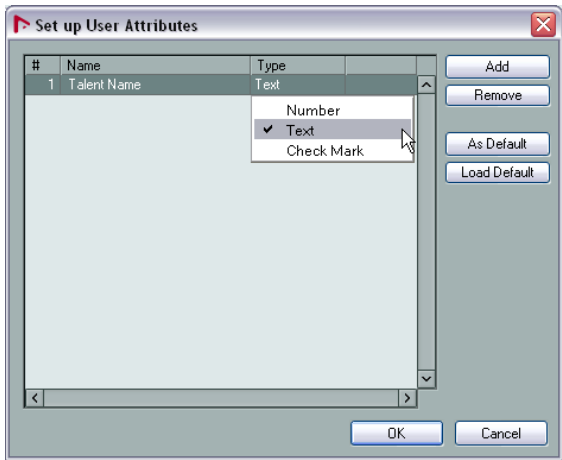
Symbol	Description
	This indicates the current Pool Record folder (see “Changing the Pool Record folder” on page 331).
	This symbol is shown if a clip has been processed.
	The question mark indicates that a clip is referenced in the project but missing from the Pool (see “About missing files” on page 328).

Symbol	Description
	This indicates that the clip file is external, i.e. located outside the current Audio folder for the project.
	This indicates that the clip has been recorded in the currently open version of the project. This is useful for finding recently recorded clips quickly.

User Attributes

You can define your own attributes for elements in the Pool. This is handy when you have a large number of audio files in the Pool. You can use the attributes to sort items in the Pool or merely keep track of some aspect of your project.

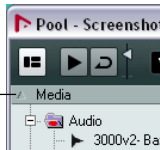
Simply select the “Define User Attributes” option from the View/Attributes pop-up menu and create as many new attributes as you need. These attributes will then get their own columns in the Pool. Each attribute can be defined as checkbox, text field or number. You can then specify the user attributes for each file, thus categorizing them further. All user attributes you created are automatically available as search criteria in the Pool and can be added as separate elements to the search pane (or replace the search criteria above the Location parameter, see above). This allows for a very detailed search, helping you to master even the largest sound database.



Sorting the Pool contents

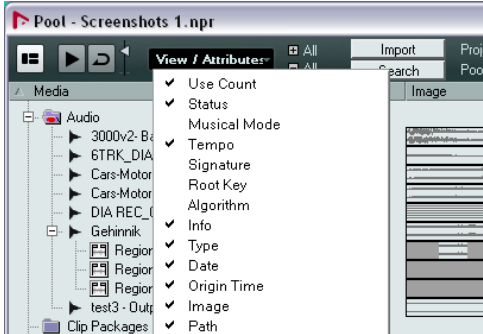
You can sort the clips in the Pool by name, date, etc. This is done by clicking on the corresponding column heading. Clicking again on the same heading switches between ascending and descending sort order.

The arrow indicates the sort column and sort order.



Customizing the view

- You can specify which of the columns are shown or hidden by opening the View/Attributes pop-up menu on the toolbar and selecting/deselecting items.



- You can rearrange the order of the columns by clicking on a column heading and dragging the column to the left or right.

The mouse pointer changes to a hand when you place it on the column heading.

- The width of a column can also be adjusted by placing the pointer between two column headers and dragging left or right.

The pointer changes to a divider when you place it between two column headers.



Operations

⇒ Most of the Pool-related main menu functions are also available on the Pool context menu (opened by right-clicking in the Pool window).

Renaming clips or regions in the Pool

To rename a clip or a region in the Pool, select it and click on the existing name, type in a new name and press [Return].

⇒ This will also rename the referenced files on disk!

⚠ Renaming a clip in the Pool is much preferred to renaming it outside Nuendo (for example on the computer desktop). This way, Nuendo already “knows” about the change, and will not lose track of the clip the next time you open the project. See [“About missing files”](#) on [page 328](#) for details about lost files.

Renaming multiple clips or regions

You can also rename multiple clips or regions in the Pool using the “Rename...” command from the Edit menu.

1. Select one or more audio clips, video clips, or regions in the Pool.

You can only select one type of object at a time.

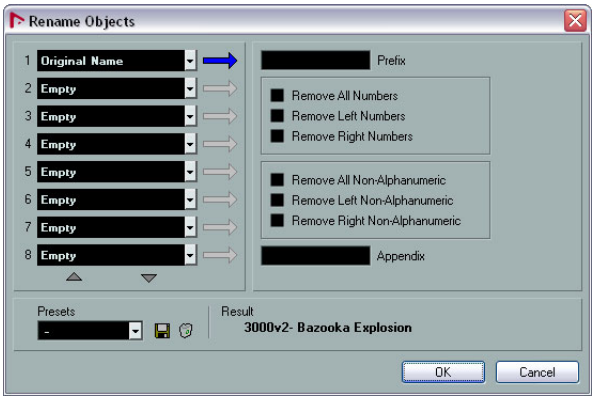
2. From the Edit menu, select “Rename...”.

A dialog with several options for renaming objects automatically will open.

3. Set the parameters for renaming objects and press [Return].

Setting parameters of the Rename Object dialog

The Rename Object dialog provides a great deal of flexibility and options when renaming multiple objects in Nuendo. In addition to simple prefix, suffix, and incremental numeric additions to names, you can remove certain characters, include timestamp information and more.



Each of the eight fields found in the left section of the Rename Objects dialog can be used to add an element to the name generated for each object.

The first line will create text or numbers at the left of the new name. The eighth and last line will create text or numbers at the very right of the new name.

Each of the eight lines can add one of the following elements including a prefix and suffix for each item (You can use a prefix to create a space separating items in the generated name.):

Option	Description
Free Text	Any text you would like to include in the name.
Original Name	The original name given to the object. There are options to remove all numbers or non-alpha numerics or just the ones on the left or right sides.
Number	An increasing or decreasing number starting with a minimum amount of digits and a starting number (i.e. 001, 002 etc.).
Project Time	The current location of the clip in the project window using any of the seven ruler formats (Bars+Beats, Time-code, etc.).
Date	The date that the file was created in several formats.
File Extension	The file type.
Audio Bitsize	The bit depth of the audio file.

Option	Description
Sample rate	The sample rate of the audio file.
Audio Tempo	The audio tempo for that clip if it has been assigned.
User Attribute	Any one of the custom attributes created in the Setup User Attributes dialog (see "User Attributes" on page 323).


An example of the result is displayed in the bottom of the window for reference. All of these parameters can be saved as a preset as well.

Duplicating clips in the Pool

To duplicate a clip, proceed as follows:

1. Select the clip you wish to copy.
2. Select "New Version" on the Media menu.

A new version of the clip appears in the same Pool folder, with the same name but with a "version number" after it, to indicate that the new clip is a duplicate. The first copy made of a clip will get the version number "2" and so on. Regions within a clip are copied too, but keep their name.

 Duplicating a clip does not create a new file on disk, but a new edit version of the clip (referring to the same audio file).

Inserting clips into a project

To insert a clip into a project, you can either use the Insert commands on the Media menu or use drag and drop.

Using menu commands

Proceed as follows:

1. Select the clip(s) you want to insert into the project.
2. Pull down the Media menu and select an "Insert into Project" option.

"At Cursor" will insert the clip(s) at the current project cursor position.
 "At Origin" will insert the clip(s) at their Origin Time position(s).

- Note that the clip will be positioned so that its snap point is aligned with the selected insert position. You can also open the Sample Editor for a clip by double-clicking it, and perform the insert operation from there. This way you can set the snap point before inserting a clip.

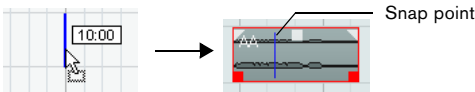
3. The clip is inserted on the selected track or on a new audio track.
 If several tracks are selected, the clip will be inserted on the first selected track.

Using drag and drop

When using drag and drop to insert clips into the Project window, please note the following:

- Snap is taken into account if activated.
- While you drag the clip in the Project window, its position is indicated by a marker line and a numerical position box.

Note that these indicate the position of the snap point in the clip. For example, if you drop the clip at the position 10.00, this will be where the snap point ends up. See ["Adjusting the snap point"](#) on [page 288](#) for information on how to set the snap point.



- If you position the clip in an empty area in the event display (i.e. below existing tracks), a new track is created for the inserted event.

Deleting clips

Removing clips from the Pool

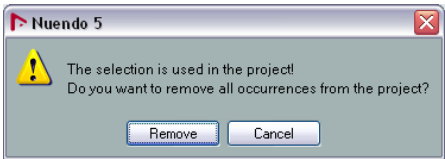
To remove a clip from the Pool without deleting it from the hard disk, proceed as follows:

1. Select the clip(s) and select "Delete" from the Edit menu (or press [Backspace] or [Delete]).

A prompt asks whether you want to move the clip to the Trash or remove it from the Pool.

- If you try to delete a clip that is used by one or more events, the program will ask you whether to remove these events from the project.

If you cancel, neither the clip nor the associated events are deleted.



2. In the window that opens, select "Remove from Pool".
 The clip is no longer associated with the project, but still exists on the hard disk and can be used in other projects, etc. This operation can be undone.

Deleting from the hard disk

To delete a file permanently from the hard disk, it must first be moved to the Trash folder:

1. Follow the instructions for deleting clips above, but click the Trash button instead of the Remove from Pool button.

Alternatively, you can drag and drop clips into the Trash folder.

2. On the Media menu, select “Empty Trash”.

A warning message is displayed.

3. Click “Erase” to delete the file on the hard disk permanently.

This operation cannot be undone!

⚠ Before you permanently delete audio files from the hard disk, make sure that they are not used by another project!

⇒ To retrieve a clip or region from the Trash folder, drag it back into an Audio or Video folder.

Removing unused clips

This function finds all clips in the Pool that are not used in the project. You can then decide whether to move them to the Trash folder (from where they can be permanently deleted) or to remove them from the Pool:

1. Select “Remove Unused Media” on the Media or context menu.

A message appears asking you whether you want to move the file to the Trash or to remove it from the Pool.

2. Make your selection.

Removing regions

To remove a region from the Pool, select it and select “Delete” from the Edit menu (or press [Backspace] or [Delete]).

⇒ For regions there is no alert if the region is used in the project!

Locating events and clips

Locating events via clips in the Pool

If you want to find out which events in the project refer to a particular clip in the Pool, proceed as follows:

1. Select one or more clips in the Pool.
2. Select “Select in Project” on the Media menu.

All events that refer to the selected clip(s) are now selected in the Project window.

Locating clips via events in the Project window

If you want to find out which clip belongs to a particular event in the Project window, proceed as follows:

1. Select one or more events in the Project window.
2. Pull down the Audio menu and select “Find Selected in Pool”.

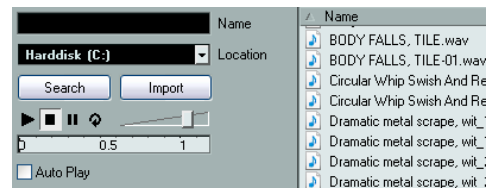
The corresponding clip(s) are located and highlighted in the Pool.

Searching for audio files

The search functions can help you locate audio files in the Pool, on your hard disk or on other media. This works much like the regular file search, but with a couple of extra features:

1. Click the Search button on the toolbar.

A search pane appears at the bottom of the window, displaying the search functions.



By default, the search parameters available in the search pane are “Name” and “Location”. For using other filter criteria, see [“Extended Search functionality”](#) on [page 327](#).

2. Specify the name of the file(s) to search for in the Name field.

You can use partial names or wildcards (*). Note that only audio files of the supported formats will be found.

3. Use the Location pop-up menu to specify where to search.

The pop-up menu will list all your local drives and removable media.

- If you want to limit the search to certain folders, choose “Select Search Path” and select the desired folder in the dialog that opens.

The search will include the selected folder and all subfolders. Note also that folders you have recently selected using the “Select Search Path” function will appear on the pop-up menu, allowing you to quickly select them again.

4. Click the Search button.

The search is started and the Search button is labeled Stop – click this to cancel the search if needed.

When the search is finished, the files found are listed to the right.

- To audition a file, select it in the list and use the playback controls to the left (Play, Stop, Pause, and Loop). If Auto Play is activated, selected files are automatically played back.
 - To import a file into the Pool, double-click on it in the list or select it and click the Import button.
5. To close the search pane, click the Search button on the toolbar again.

Extended Search functionality

Apart from the search criterion Name, additional search filters and user attributes are available. The Extended Search options allows for a very detailed search, helping you to master even the largest sound database.

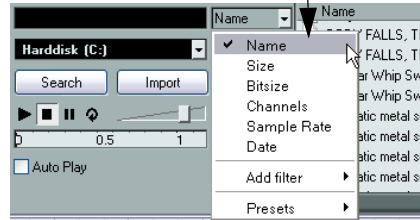
To use them, proceed as follows:

1. Set up a couple of user attributes using the “View/Attributes” pop-up menu.
 2. Click the Search button on the toolbar.
- The Search pane is displayed in the lower part of the Pool window.

3. Move the mouse pointer over the “Name” text to the right of the name field and click on the arrow that appears.



Move the mouse pointer over the “Name” text to the right of the name field and click...



...to show the extended search pop-up menu.

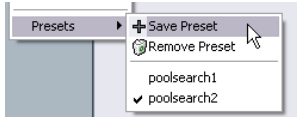
4. The extended search pop-up menu opens.

It contains six options determining which search criterion is displayed above the Location field (Name, Size, Bitsize, Channels, Sample Rate or Date). It also contains all the user attributes you specified, as well as the Add Filter and Presets submenus.

The search criteria have the following parameters:

- Name: partial names or wildcards (*)
 - Size: Less than, More than, Equal, Between (two values), in seconds, minutes, hours and bytes
 - Bitsize (resolution): 8, 16, 24, 32
 - Channels: Mono, Stereo and from 3 to 16
 - Sample Rate: various values, choose “Other” for free setting
 - Date: various search ranges
5. Select one of the search criteria in the pop-up menu to change the search option above the Location pop-up menu.
 6. If you want to display more search options, select the desired element from the “Add filter” submenu.
- This allows you, for example, to add the Size or the Sample Rate parameters to the already displayed Name and Location parameters.

- You can save presets of your search filter settings. To do this, click Save Preset on the Presets submenu and enter a name for the preset.



Existing presets can be found at the bottom of the list. To remove a preset, click on the preset to activate it, then select Remove Preset.

The Find Media window

Alternatively to the search pane in the Pool, you can open a stand-alone Find Media window by selecting the “Search Media...” option from the Media or context menu (also available from the Project window). This offers the same functionality as the search pane.

- To insert a clip or region directly into the project from the Find Media window, select it in the list and choose one of the “Insert into Project” options from the Media menu. The options are described in the section [“Inserting clips into a project”](#) on [page 325](#).
- It is also possible to further refine the search options by including your user attributes in the search criteria. When user attributes have been defined, these will appear on the pop-up menu (see above).

About missing files

When you open a project, the Resolve Missing Files dialog (see below) may open, warning you that one or more files are “missing”. If you click Close, the project will open anyway, without the missing files. In the Pool, you can check which files are considered missing. This is indicated by a question mark in the Status column.

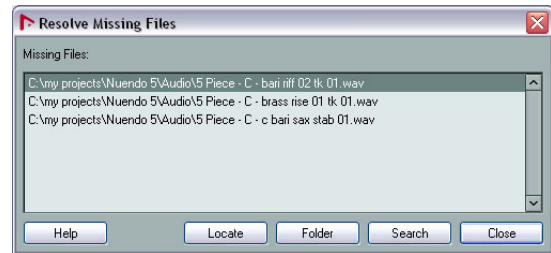
A file is considered missing under one of the following conditions:

- The file has been moved or renamed outside the program since the last time you worked with the project, and you ignored the Resolve Missing Files dialog when you opened the project for the current session.
- You have moved or renamed the file outside the program during the current session.
- You have moved or renamed the folder in which the missing files are located.

Locate missing files

1. Select “Find Missing Files...” from the Media or context menu.

The Resolve Missing Files dialog opens.



2. Decide if you want the program to try to find the file for you (Search), if you want to do it yourself (Locate) or if you want to specify in which directory the program will search for the file (Folder).

- If you select Locate, a file dialog opens, allowing you to locate the file manually. Select the file and click “Open”.
- If you select Folder, a dialog opens to let you specify the directory in which the missing file can be found. This might be the preferred method if you have renamed or moved the folder containing the missing file, but the file still has the same name. Once you select the correct folder, the program finds the file and you can close the dialog.
- If you select Search, a dialog opens to let you specify which folder or disk will be scanned by the program. Click the Search Folder button, select a directory or a disk and click the Start button. If found, select the file from the list and click “Accept”. Afterwards Nuendo tries to map all other missing files automatically.

Reconstructing missing edit files

If a missing file cannot be found (e.g. if you have accidentally deleted it from the hard disk), it will normally be indicated with a question mark in the Status column in the Pool. However, if the missing file is an edit file (a file created when you process audio, stored in the Edits folder within the project folder), it may be possible for the program to reconstruct it by recreating the editing to the original audio file.

Proceed as follows:

1. Open the Pool and locate the clip(s) for which files are missing.
2. Check the Status column – if it says “Reconstructible”, the file can be reconstructed by Nuendo.
3. Select the reconstructible clips and select “Reconstruct” from the Media menu.
The editing is performed and the edit files are recreated.

Removing missing files from the Pool

If the Pool contains audio files that cannot be found or reconstructed, you may want to remove these. For this, select “Remove Missing Files” from the Media or context menu. This will remove all missing files from the Pool as well as the corresponding events from the Project window.

Auditioning clips in the Pool

There are three ways to audition clips in the Pool:

- By using key commands.
If you activate the “Playback Toggle triggers Local Preview” option in the Preferences dialog (Transport page), you can use [Space] to audition. This is the same as clicking the Audition icon on the toolbar.
- By selecting a clip and activating the Audition button.
The whole clip will play back, unless you stop playback by clicking the Audition button again.
- By clicking somewhere in the waveform image for a clip.
The clip will play from the position in the waveform you click until the end of the clip, unless you stop playback by clicking the Audition button, or by clicking anywhere else in the Pool window.

The audio is routed directly to the Control Room, if activated. When the Control Room is deactivated, the audio is routed to the Main Mix (the default output) bus, bypassing the audio channel's settings, effects and EQs.

⇒ You can adjust the auditioning level with the miniature level fader on the toolbar. This does not affect the regular playback level.

If you have activated the Audition Loop button before you audition, the following will happen:

- When you click the Audition button to audition a clip, the clip is repeated indefinitely until you stop playback by clicking the Audition or Audition Loop button again.

- When you click in the waveform image to audition, the section from the point you clicked to the end of the clip is repeated indefinitely until you stop playback.

Opening clips in the Sample Editor

The Sample Editor allows you to perform detailed editing on the clip (see “[The Sample Editor](#)” on [page 282](#)). You can open clips in the Sample Editor directly from the Pool in the following ways:

- If you double-click a clip waveform icon or a clip name in the Media column, the clip opens in the Sample Editor.
- If you double-click a region in the Pool, its clip opens in the Sample Editor with the region selected.

One practical use for this is to set a snap point for a clip (see “[Adjusting the snap point](#)” on [page 288](#)). When you later insert the clip from the Pool into the project, you can have it be properly aligned according to the set snap point.

About the Import Medium dialog

The Import Medium dialog lets you import files directly into the Pool. It is opened from the Media or context menu or using the Import button in the Pool window.

This is a standard file dialog, where you can navigate to other folders, audition files, etc. The following audio file formats can be imported:

- Wave (Normal or Broadcast, see “[Broadcast Wave files](#)” on [page 479](#))
- AIFF and AIFC (Compressed AIFF)
- REX or REX 2 (see “[Importing ReCycle files](#)” on [page 554](#))
- Dolby Digital AC3 file (ac3 – if you have the Steinberg Dolby Digital Encoder installed in your system)
- DTS file (dts – if you have the Steinberg DTS Encoder installed in your system)
- SD2 (Sound Designer II)
- MPEG Layer 2 and Layer 3 (MP2 and MP3 files – see “[Importing compressed audio files](#)” on [page 555](#))
- Ogg Vorbis (OGG files – see “[Importing compressed audio files](#)” on [page 555](#))
- Windows Media Audio (Windows – see “[Importing compressed audio files](#)” on [page 555](#))
- Wave 64 (W64 files)

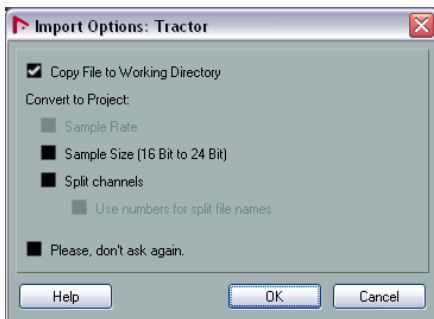
They may have the following characteristics:

- Stereo or mono
- Any sample rate (although files with another sample rate than the one used in the project will play back at the wrong speed and pitch – see below).
- 8, 16, 24 bit or 32 bit float resolution.

Various video formats can be imported. For information about the supported video formats, see [“Video file compatibility”](#) on [page 521](#).

⇒ It is also possible to use the commands on the Import submenu of the File menu to import audio or video files into the Pool.

When you select a file in the Import Medium dialog and click Open, the Import Options dialog opens.



It contains the following options:

- **Copy File to Working Directory**

Activate this if you want a copy of the file to be made in the Audio folder of the project, and have the clip refer to this copy. If the option is off, the clip will refer to the original file in the original location (and will thus be marked as “external” in the Pool – see [“About the Status column symbols”](#) on [page 322](#)).

- **Convert to Project section**

Here you can choose to convert the sample rate (if the sample rate is different than the one set for the project) or the sample size, i.e. resolution (if the sample size is lower than the record format used in the project). The options are only available if necessary. Note that if you are importing several audio files at once, the Import Options dialog will instead contain a “Convert and Copy to Project if needed” checkbox. When this is activated, the imported files will be converted only if the sample rate is different or the sample size is lower than the project's.

- **Split channels/Split multi-channel files**

If this is activated, stereo and multi-channel files are split into a corresponding number of mono files – one for each channel – and these will be imported into the Pool. Note that if you use this option, the imported files will always be copied to the Audio folder of the project, as described above.

- **Please, don't ask again**

If this is activated, files will always be imported according to the settings you have made, without this dialog appearing. This can be reset in the Preferences dialog (Editing–Audio page).

⇒ You can always convert files later by using the Convert Files (see [“Convert Files”](#) on [page 332](#)) or Conform Files (see [“Conform Files”](#) on [page 333](#)) options.

About the Import Audio CD dialog

You can import tracks (or sections of tracks) from an audio CD directly into the Pool by using the “Import Audio CD...” function on the Media menu. This opens a dialog in which you can specify which tracks are copied from the CD, converted to audio files and added to the Pool.

For details about the Import from Audio CD dialog, see [“Importing audio CD tracks”](#) on [page 553](#).

Exporting regions as audio files

If you have created regions within an audio clip (see [“Working with regions”](#) on [page 291](#)), these can be exported as separate audio files. To create a new audio file from a region, proceed as follows:

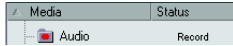
1. In the Pool, select the region you wish to export.
2. On the Audio menu, select “Bounce Selection”. A browser dialog opens.
3. Select the folder in which you want the new file to be created.

A new audio file is created in the specified folder. The file will have the name of the region and will automatically be added to the Pool.

⇒ If you have two clips that refer to the same audio file (different “versions” of clips, e.g. created with the “Convert to Real Copy” function), you can use the Bounce Selection function to create a new, separate file for the copied clip. Select the clip, select Bounce Selection, and enter a location and name for the new file.

Changing the Pool Record folder

All audio clips that you record in the project will end up in the Pool Record folder. The Pool Record folder is indicated by the text “Record” in the Status column and by a red dot on the folder itself.



By default, this is the main Audio folder. However, you can create a new Audio subfolder at any time and designate this as your Pool Record folder:

1. Select the Audio folder or any audio clip.
You cannot designate the Video folder (or any of its subfolders) as the Pool Record folder.
2. Select “Create Folder” on the Media or context menu.
A new empty subfolder named “New Folder” appears in the Pool.
3. Select the new folder and rename it as desired.
4. Select “Set Pool Record Folder” on the Media or context menu, or click in the Status column of the new folder.
The new folder now becomes the Pool Record folder, and any audio recorded in the project will be saved in this folder.

Organizing clips and folders

If you accumulate a large number of clips in the Pool, it may sometimes be difficult to quickly find specific items. In such cases, organizing clips in new subfolders with suitable names that reflect the content can be a solution. For example, you could put all sound effects in one folder, all lead vocals in another, etc. Proceed as follows:

1. Select the type of folder, audio or video, for which you want to create a subfolder.
You cannot put audio clips in a video folder and vice versa.
2. Select “Create Folder” on the Media or context menu.
A new empty subfolder named “New Folder” appears in the Pool.
3. Rename the folder as desired.
4. Drag and drop the clips you wish to move to the new folder.
5. Repeat steps 1–4 as necessary.

Applying processing to clips in the Pool

You can apply audio processing to clips from within the Pool in the same way as to events in the Project window. Simply select the clip(s) and choose a processing method from the Audio menu. To find out more about audio processing, see the chapter [“Audio processing and functions”](#) on [page 263](#).

Undoing processing

If you have applied processing to a clip, in the Project window, the Sample Editor, or in the Pool, this is indicated by the red and gray waveform symbol in the Status column. This processing can always be undone using the Offline Process History, see [“The Offline Process History dialog”](#) on [page 275](#).

Freeze Edits

You can use the Freeze Edits function to create a new file with processing applied or to replace the original with a processed version, see [“Freeze Edits”](#) on [page 277](#).

Minimize File

The “Minimize File” option on the Media or context menu allows you shrink the audio files according to the size of the audio clips referenced in a project. The files produced using this option only contain the audio file portions actually used in the project. This can significantly reduce the size of the project, if large portions of the audio files are unused. Therefore, the option is useful for archiving purposes after you have completed a project.

⇒ This operation will permanently alter the selected audio files in the Pool. This cannot be undone! If this is not what you want, you can use the “Back up Project” option on the File menu instead, see [“Back up Project”](#) on [page 54](#). This function also has the option of minimizing files, but copies all files into a new folder, leaving the original project untouched.

Proceed as follows:

1. Select the file(s) you wish to minimize.
2. Select “Minimize File” on the Media menu.
An alert appears, informing you that the entire Edit History will be cleared. Click Minimize to proceed or Cancel to stop the process.
3. After the minimizing is finished, another alert appears, because the file references in the stored project have become invalid.
Click Save Now to save the updated project or click Later to proceed with the unsaved project.

Only the audio portions actually used in the project remain in the corresponding audio file(s) in the Pool Record folder.

Prepare Archive

The “Prepare Archive” option on the Media menu is useful if you want to archive a project. For detailed information about the Prepare Archive feature, see [“Prepare Archive” on page 54](#).

Importing and exporting Pool files

You can import or export a Pool as a separate file (file extension “.npl”), by using the “Import Pool” and “Export Pool” options on the Media or context menu.

When you import a Pool file, the file references in it are “added” to the current Pool.

⇒ Since the audio and video files are only referenced but not saved in the Pool file, the Pool import is only useful if you have access to all referenced files (which preferably have the same file paths as when the Pool was saved).

You can also save and open libraries. These are standalone Pool files that are not associated with a project.

Working with libraries

You can use libraries to store sound effects, loops, video clips, etc., and transfer media from a library into a project by using drag and drop. The following library functions are available on the File menu:

New Library

Creates a new library. Just as when creating new projects, you will be asked to specify a project folder for the new library (in which media files will be stored). The library appears as a separate Pool window in Nuendo.

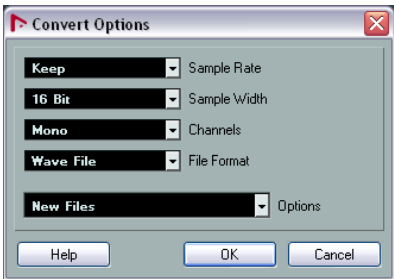
Open Library

Opens a file dialog for opening a saved library file.

Save Library

Opens a file dialog for saving the library file (file extension “.npl”).

Convert Files



Selecting the “Convert Files” option on the Media or context menu opens the Convert Options dialog which operates on selected files. Use the pop-up menus to specify which audio file attributes you want to keep and which you want to convert. The available settings are:

- **Sample Rate**
Keep as is, or convert to a sample rate between 8.000 and 96.000 kHz.
- **Sample Width**
Keep the sample width (resolution) as is, or convert to 16 Bit, 24 Bit or 32 Bit Float.
- **Channels**
Keep as is, or convert the file to Mono or Stereo Interleaved.
- **File Format**
Keep as is, or convert to Wave, AIFF, Wave 64 or Broadcast Wave format.

Options

When you convert a file, you can use the Options pop-up menu to set one of the following options regarding what to do with the new file:

Option	Description
New Files	Creates a copy of the file in the audio folder and converts this new file according to the chosen attributes. The new file is added to the Pool, but all clip references will still point to the original, unconverted file.

Option	Description
Replace Files	Converts the original file without changing clip references. The references are however saved with the next save action.
New + Replace in Pool	Creates a new copy with the chosen attributes, replaces the original file with the new one in the Pool and redirects the current clip references from the original file to the new file. This is the option to select if you want your audio clips to refer to the converted file, but still want to keep the original file on disk (e.g. if the file is used in other projects).

Conform Files

By using this command, you will change all selected files that have different file attributes than what is specified for the project, to conform to this standard.

Proceed as follows:

1. Select the clips in the Pool.
2. Select “Conform Files...” on the Media menu.

A dialog opens allowing you to choose between keeping or replacing the original unconverted files in the Pool.

The following applies:

- Clip/event references in the Pool are always redirected to the conformed files.
- If any “keep” option is selected, original files remain in the Project’s Audio folder and new files are created.
- If you select the “Replace” option, files in the Pool and in the Project’s Audio folder are replaced.

Extract Audio from Video File

This Media menu item allows you to extract the audio from a video file on disk. It automatically generates a new audio clip that will appear in the Pool Record folder. The resulting clip will have the following properties:

- It will get the same file format and sample rate/width as in the current project.
- It will get the same name as the video file.

⇒ This function is not available for MPEG video files.

Introduction

One of the biggest challenges in typical computer-based production environments is how to manage the ever-growing number of plug-ins, instruments, sounds, presets, etc. from multiple sources. Nuendo features an efficient database for media file management that allows you to handle all your media files from within your sequencer program.



The MediaBay is divided into several sections:

- **Define Locations** – Here, you can create “presets” for locations on your system that you want to scan for media files, see [“Defining Locations”](#) on [page 338](#).
- **Locations** – Here, you can switch between the previously defined Locations.
- **Filters** – Here, you can filter the Results list using a logical or an attribute filter, see [“The Filters section”](#) on [page 345](#).
- **Results** – Here, all found media files are displayed. You can also filter the list and perform text searches, see [“The Results list”](#) on [page 339](#).
- **Previewer** – This section allows you to preview the files shown in the Results list, see [“Previewing files”](#) on [page 342](#).
- **Attribute Inspector** – In this section, you can view, edit and add media file attributes (or tags), see [“The Attribute Inspector”](#) on [page 347](#).

By default, the Locations section, the Results list, the Previewer section and the Attribute Inspector are shown.

Accessing the MediaBay

To open the MediaBay, select the MediaBay command on the Media menu. You can also use the corresponding key command (by default F5).

Setting up the MediaBay window

You can show and hide the different sections of the MediaBay (except for the Results list). This is handy, as it allows you to save screen space and enables you to display only the information you need for your work.

Proceed as follows:

1. Click the “Set up Window Layout” button in the lower left corner of the MediaBay window.



A transparent pane appears, covering the window. In the center of it is a gray area containing checkboxes for the different sections.



2. Deactivate the checkboxes for the sections you want to hide from view.

Any changes you make here are directly reflected in the MediaBay window. Note that the Results list cannot be hidden.

⇒ You can also use key commands for this: use the up/down and left/right arrow keys to step through the checkboxes and press [Space] to activate/deactivate the desired checkbox.

3. When you are done, click outside the gray area to exit the Setup mode.

Alternatively, you can wait a few seconds for the pane to disappear automatically.

- You can change the size of the individual MediaBay sections by dragging the divider line between two sections.

Working with the MediaBay

When working with many media files, the most important thing is to find the content you need quickly and easily. The MediaBay helps you find and organize your content in an effective and efficient way. After the first scan of the folders you have activated for scanning (which will take a certain time), all the files that were found are there for you to browse, tag or modify.

At the beginning, all media files of the supported formats are listed in the Results section: far too many to get a good overview. However, by using the search and filter techniques, you get the desired results very quickly.

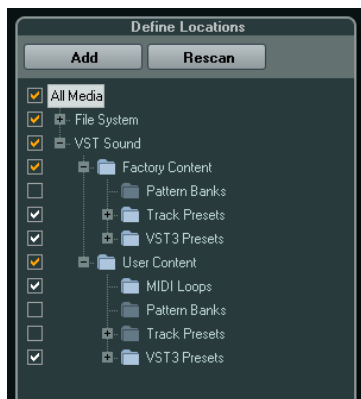
The first thing to do is to set up “Locations”, that is folders or directories on your system that contain media files. Usually, files are organized in a specific way on your computer. For example, you might have folders reserved for audio content, folders for special effects, folders for combinations of sounds making up the ambience noise you need for a certain film take, etc. These can all be set as different Locations in the MediaBay, allowing you to limit the files available in the Results list according to context.

Whenever you expand your computer system (for example, by adding new hard disks or an external volume containing media files you want to work with), you should make it a habit to save the new volumes as Locations or add them to your existing Locations. Afterwards, you can hide the Define Locations section from view. That way, the MediaBay occupies less screen space and you can concentrate on the important thing: the Results list.

For this list, you can specify which file types are displayed, see [“Filtering according to media type”](#) on [page 339](#). If there are still too many files to choose from, you can narrow down the results using a text search function, see [“Performing a text search”](#) on [page 340](#). This is often all it needs to display what you want, allowing you to proceed by previewing the files before inserting them into your project (see [“Previewing files”](#) on [page 342](#)). However, if you need very complex and detailed filtering, this is also possible using either attribute or logical filtering, see [“The Filters section”](#) on [page 345](#). For filtering or searches, the use of attributes is recommended: By specifying specific attribute values for your files (categorizing them as production sound, foley, special effects, etc.), you can considerably speed up the browsing process, see [“The Attribute Inspector”](#) on [page 347](#).

Finally, the files can be easily inserted into the project, by using drag & drop, by double-clicking or using the context menu options, see [“Inserting the files into the project”](#) on [page 341](#).

The Define Locations section

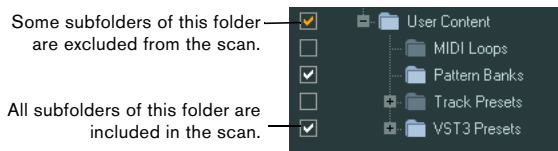


When you open the MediaBay for the first time, a scan for media files is performed on your system. You specify which folders or directories you want to be included in the scan by activating/deactivating the checkboxes for the folders in the Define Locations section. Depending on the amount of media files on your computer, the scan may take a while. All files that are found in the specified folders are shown in the Results list.

- To include a folder in the scan, activate its checkbox.
- To exclude a folder from the scan, deactivate its checkbox.
- To restrict the search to individual subfolders, activate/deactivate their checkboxes.

The color of the checkmark helps you to identify which folders and subfolders are scanned:

- A white checkmark indicates that all subfolders are scanned.
- An orange checkmark indicates that at least one subfolder is excluded from the scan.



- To revert to scanning a complete folder (including all subfolders), click on an orange checkmark. The checkmark becomes white, to indicate that all folders are scanned.

The scanning status for the individual folders themselves is indicated by the color of the folder icons:

- A red icon means that the folder is currently being scanned.
- A light blue icon means the folder has been scanned.
- A dark blue icon is displayed for folders which are excluded from the scan.
- An orange icon is displayed when the scanning process for the folder was interrupted.
- A yellow icon is displayed for folders that have not yet been scanned.

The scan result is saved in a database file. When you deactivate the checkbox for a folder that has already been scanned, a message appears, allowing you to keep the gathered scan data in this database file or to completely remove the data for this folder from the database file. Select Keep if you want to keep the database entries, but want to exclude the folder from being scanned (when you trigger a re-scan for example). Select Remove if you do not want to use the contents of this folder in your projects.

- When you activate the “Please, don’t ask again” option, no further warning messages will be shown when you deactivate other checkboxes, for as long as the program is running.

When you quit and re-launch Nuendo, these warning messages will be displayed again.

The VST Sound node

The Define Locations section provides a shortcut to user content and factory content files, including the preset folders: the VST Sound node.

- The folders below the VST Sound node represent the directories in which content files and track presets, VST presets, etc. are stored by default.

To find out the “true” location of a file, right-click on it in the Results list and select “Open in Explorer” (Win)/“Reveal in Finder” (Mac). This will open an Explorer/Finder window in which the corresponding file is highlighted. Please note that this function is not available for files which are part of a VST Sound archive.

Updating the display

You can update the display in two ways: by rescanning or by refreshing.

Rescanning

When you click the Rescan button, the selected folder is rescanned. If a folder contains a large number of media files, the scanning process may take some time. Use this function if you have made changes to the content of specific media folders and want to scan these folders again.



⇒ You can also rescan the selected folder by right-clicking on it and selecting Rescan Disk from the context menu.

Refreshing

In addition to the Rescan Disk option, the context menu for the selected node or folder in the Define Locations section also contains a Refresh Views option. This refreshes the display for this location without rescanning the corresponding media files.

This is useful in the following situations:

- When you have modified attribute values (see [“Editing attributes \(tagging\)”](#) on [page 348](#)) and want to update the Results list so that these values are displayed for the corresponding files.
- When you have mapped a new network drive, for example, and want this to appear as a node in the Define Locations section. Simply select the Refresh Views option for the parent node and the new drive will appear in the Define Locations section (ready to be scanned for media files).

Defining Locations

When you have set up the Define Locations section according to your preferences, and the content is scanned, it is time to make it available in a meaningful way. For this, you can define locations, i.e. shortcuts to the folders you want to work with, that will be available from the Locations section for convenient access.

To define a location, proceed as follows:

1. In the list to the left, select the desired folder.
2. Click the Add button.

A naming dialog for the new location is displayed.

3. Accept the default name or enter a new name.
4. Click OK.

The new location is added to the Locations pop-up menu in the Locations section (see below).

5. Repeat these steps to add as many locations as you need.

Once you have set up your locations, you can hide the Define Locations section from view (see [“Setting up the MediaBay window”](#) on [page 335](#)), to save screen space.

⇒ Some Location presets are available by default. These are: “All Media” (the topmost node in the Define Locations section), “Local Harddisks” (the local harddisks in your computer system) and “VST Sound” (the folder in which Steinberg sound files, loops and presets are stored by default).

The Locations section

When you open the Locations pop-up menu and select a location, the media files found in that location are shown in the Results list. By switching between the locations you defined, you can quickly browse to the files you are looking for.



- To change the browse location, simply select another location from the pop-up menu.

If the available Locations don't yield the desired results or if the folder you want to scan for files is not part of any of the locations, define a new Location in the Define Locations section.

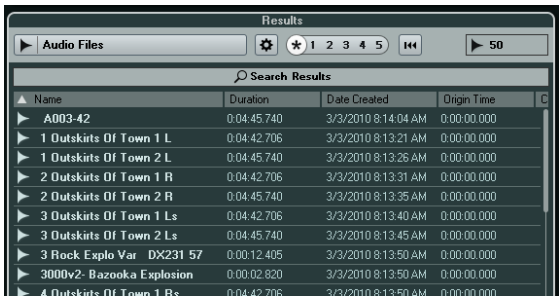
- To select the previous or next folder in a sequence of selected folders, use the “Previous/Next Browse Location” buttons.

These paths will be deleted when you close the MediaBay.

- To select the parent folder of the selected folder, click the “Browse Containing Folder” button.
 - To remove a location from the pop-up menu, select it and click the “Remove Browse Location Definition” button.
 - To show the files contained in the selected folder and any subfolders (without showing these subfolders), activate the Deep Results button.
- When this button is deactivated, only the folders and files contained in the selected folder are shown.

The Results list

The Results list is at the heart of the MediaBay. Here, you will find all the files found in the selected location.



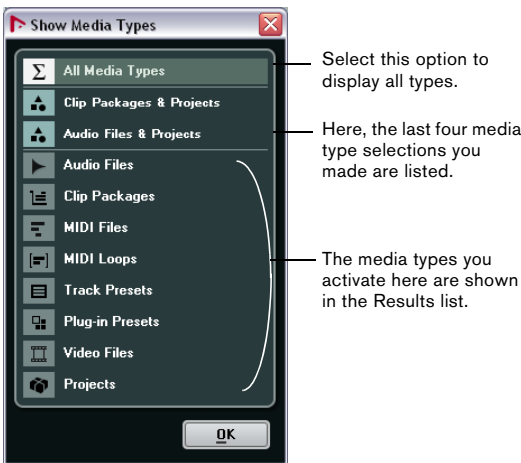
As the number of files displayed can be huge (the info field in the top right corner of the Results section shows the number of files found with the current filter settings), you might want to use any of the filter and search options in the MediaBay to narrow down the list. The available options are described below.

⇒ The maximum number of files that are displayed in the Results list can be set by specifying a new value for “Maximum Items in Results list” in the Preferences (see “[Preferences](#)” on [page 352](#)).

Filtering according to media type

The Results list can be set to display only a particular media type or a combination of media types.

- Click in the field where the currently displayed media types are shown (by default “All Media Types”) to open the Show Media Types dialog.
- Here, you can activate the media types you want to be displayed in the Results list.



When you have filtered the list to show a particular media type, this is indicated by the corresponding icon to the left of media type field. When you have selected several media types, the Mixed Media Type icon is used.

The media types

In the “Show Media Types” dialog, you can activate the media types you want to be displayed in the Results list. The following types are available:

Option	Description
Audio Files	When this is activated, the list shows all audio files. The supported formats are .wav, .w64, .aiff, .aifc, .rex, .rx2, .mp3, .mp2, .ogg, .sd2, .wma (Windows only).
Clip Packages	When this is activated, the list shows all clip packages (file name extension .package). Clip packages contain a number of audio parts and events, which make up a special sound. For more information, see “ Clip packages ” on page 566 .
MIDI Files	When this is activated, the list shows all MIDI files (file name extension .mid).

Option	Description
MIDI Loops	When this is activated, the list shows all MIDI loops (file name extension .midiloop).
Pattern Banks (Nuendo Expansion Kit only)	When this is activated, the list shows all pattern banks (file name extension .patternbank). Pattern banks are generated by the MIDI plug-in Beat Designer. For more information, see “Previewing pattern banks (Nuendo Expansion Kit only)” on page 344 and the separate PDF document “Plug-in Reference”.
Track Presets	When this is activated, the list shows all track presets for audio, MIDI, and instrument tracks (file name extension .trackpreset). Track presets are a combination of track settings, effects and mixer settings that can be applied to new tracks of various types. For more information, see the chapter “Working with track presets” on page 356 .
Plug-in Presets	When this is activated, the list shows all VST presets for instrument and effect plug-ins. These presets contain all parameter settings for a particular plug-in. They can be used to apply sounds to instrument tracks and effects to audio tracks. For more information, see the chapter “Working with track presets” on page 356 .
Video Files	When this is activated, the list shows all video files. For information about the supported video formats, see “Video file compatibility” on page 521 .
Projects	When this is activated, the list shows all project files (from Cubase, Nuendo, Sequel): .cpr, .npr, .steinberg-project.

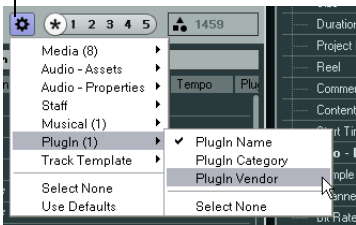
Setting up the Results list columns

For each media type, or for combinations of media types, you can specify the attribute columns that are displayed in the Results list. In most cases, you will probably only want to display a few main attributes in the Results list and use the Attribute Inspector to view the complete list of attribute values for the files.

Proceed as follows:

1. Select the media type (or combination of media types) that you want to make settings for.
2. Click the “Set up Result Columns” button and activate or deactivate the options on the submenus.

Click here to open the pop-up menu.



Activate the attributes that you want to be displayed in the Results list.

- ⇒ If you want to see none of the attributes of a certain category, choose the “Select None” option on the corresponding submenu.
- ⇒ When the “Allow Editing in Results List” option is activated in the Preferences dialog, you can also edit attributes in the Results list. Otherwise this is only possible in the Attribute Inspector.

Performing a text search

You can limit the number of results in the Results list using the text search function. When you enter text in the Text Search field, only media files whose attributes match the entered text will be displayed.



For example, if you are looking for all audio loops relating to drum sounds, simply enter “drum” in the search field. The search results will contain loops with names such as “Drums 01”, “Drumloop”, “Snare Drum”, etc. Also, all media files with the Category attribute Drum&Percussion, or any other attribute that contains “drum” will be found.

When you enter text in the field, its background becomes red, to indicate that a text filter is active for the list. To reset the text filter, delete the text.

Boolean text search

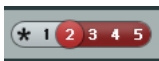
You can also perform advanced searches, using boolean operators or wildcards. The following elements can be used:

Option	Description
And [+]	[a and b] – When entering strings separated by “and” (or a plus sign), all files are found that contain both a and b. [And] is the default setting when no boolean operator is used, i.e. you can also enter [a b].
Or [,]	[a or b] – When entering strings separated by “or” (or a comma), files are found that contain either a or b, or both.
Not [-]	[not b] – When entering text preceded by “not” (or a minus sign), all files not containing b will be found.
Parentheses [()]	[(a or b) + c] – Using parentheses, you can group text strings. In this example, files are found that contain c and either a or b.
Quotation marks [“ ”]	[“example text”] – With quotation marks, you can define sequences of several words. Files are found if they contain this sequence of words.

⇒ These operators can also be used for Logical filtering with the “matches” condition selected, see [“Applying a logical filter”](#) on [page 345](#).

⚠ When you are searching for files whose name contains a hyphen, put the search text in quotation marks, because otherwise the program will treat the hyphen as the boolean operator “not”.

The rating slider



With this setting, only files with a rating of at least 2 are displayed.

Using the rating slider above the Results list, you can specify rating settings for your files, ranging from 1 to 5. This makes it possible to exclude certain files from the search according to their quality.

When you move the rating slider, the active rating filter is indicated in red. All files of this rating are displayed in the list.

The search in progress indicator

At the top right in the Results list you will find an indicator which shows whether the MediaBay is currently searching for files.



— When this indicator is shown, a media search is in progress.

Resetting the list

When you have set up filters for the Results list, you can set everything back to default by clicking the Reset Results Filter button to the right of the Rating slider.



This will delete any text in the text search field, set the rating slider to display all files and deactivate all the media type filters.

Inserting the files into the project

You can insert files into the project by right-clicking on them and selecting one of the “Insert into project” options from the context menu, or you can double-click them. What happens next depends on the track type:

Audio files, MIDI loops, and MIDI files can be inserted into the project by double-clicking them in the Results list. They will be inserted on the active track, if this matches the file type or onto a new track if no corresponding track is active. The files will be inserted at the current project cursor position.

Similarly, if you double-click on a track preset, it will be applied to the active track, if the track type matches the track preset. Otherwise, a new track will be inserted, containing the settings of the track preset.

If you double-click a VST preset, an instrument track is added to the project, containing an instance of the corresponding instrument. For some VST presets, this will load the entire instrument settings, programs, etc. For others, only one program will be loaded, see [“Applying instrument presets”](#) on [page 354](#).

When you double-click on a pattern bank (Nuendo Expansion Kit only), a new MIDI track is created in the Project window, with an instance of the Beat Designer plug-in as insert effect which is using this pattern.

Managing files in the Results list

- You can move/copy a file from the Results list to another location by clicking on it and dragging it to another folder in the Define Locations section.

You will be asked whether you want to copy or move the file to the new location.

- You can change the display order in the Results list by clicking on a column heading, and dragging that heading to another position in the display.
- To delete a file, right-click it in the list and select Delete from the context menu.

A warning message is displayed, asking you to confirm that you really want to move this file to the operating system's trash folder. The data you delete here will be permanently deleted from your computer, therefore be sure to delete only the files you do not want to use any more.

⚠ When a file was deleted in the Explorer/Finder, it will still be displayed in the Results list, although it is no longer available to the program. To remedy this, you have to re-scan the corresponding folder.

Previewing files

When you have sufficiently narrowed down the list of files, you will want to preview individual files to find out which one to use in your project. This is done in the Previewer section.

Note that some MediaBay-specific Preferences affect the playback of media files, see [“Preferences”](#) on [page 352](#).

The elements visible in this section and their functions depend on the type of media file.

⚠ The Previewer section is not available for video files, project files, and audio track presets.

Previewing audio files



To preview an audio file, click the Play button. What happens next depends on the following settings:

- When “Auto Play New Results Selection” is activated, any file you select in the Results list is automatically played back.

- When “Align Beats to Project” is activated, the file you selected for preview in the Results list is played back in sync with the project, starting at the project cursor position. Note that this may apply realtime time stretching to your audio file.

When you import an audio file into your project for which “Align Beats to Project” is activated in the Previewer, Musical mode is automatically activated for the corresponding track.

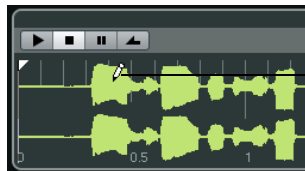
- When “Wait for Project Play” is activated, the Play and Stop functions from the Transport panel are synchronized with the Play and Stop buttons in the Previewer section. This option is very useful for previewing audio loops. To use it to its full extent, set the left locator at the beginning of a bar, then start playing back the project using the Transport panel. The loops that you now select in the Results list will start together with the project in perfect sync. Play and Stop of the Previewer transport can still be used if needed.

Using selection ranges

In the Previewer for audio files, you can also specify selection ranges for audio files, allowing you to only preview this particular section and insert it into the project.

⚠ Selection ranges cannot be used when the “Align Beats to Project” option is activated in the Previewer.

- To make a selection range, move the mouse over the upper part of the waveform, so that it turns into a pencil, click and drag.



When the pencil is shown, you can click and drag to make a selection range.

You can drag the handles to adjust the borders of the selection range.



- To remove the selection, drag both handles all the way to the left.

Previewing MIDI files



To preview a MIDI file (.mid), you first have to select an output device from the Output pop-up menu.

- “Auto Play New Results Selection” and “Align Beats to Project” work as for audio files, see above.

Previewing MIDI loops

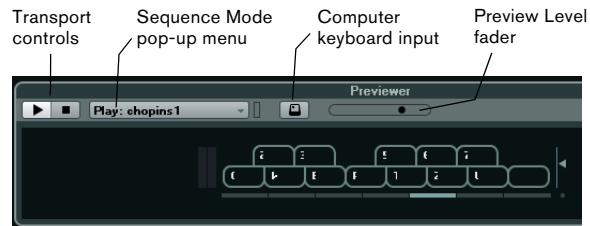
To preview a MIDI loop file, click the Play button.

- “Auto Play New Results Selection” works as for audio files, see above.

MIDI loops are always played back in sync to the project.

Previewing VST presets and track presets for MIDI and instrument tracks

⇒ Track presets for audio tracks can only be previewed in the Presets browser (see [“Loading track or VST presets in the Inspector or the context menu of the track”](#) on page 359).



Track presets for MIDI or instrument tracks and VST presets require MIDI notes for previewing. These notes can be sent to the track preset in the following way:

- Via MIDI Input
- Using a MIDI file
- Using the Memo Recorder
- Via the computer keyboard

These methods will be described in the following sections.

Previewing presets via MIDI Input

MIDI input is always active, i.e. when a MIDI keyboard is connected to your computer (and set up properly), you can directly start playing the notes to preview the selected preset.

Previewing presets using a MIDI file

Proceed as follows:

1. On the Sequence Mode pop-up menu, select “Load MIDI File”.
2. In the file dialog that opens, navigate to the desired MIDI file, and click Open.
The name of the MIDI file is displayed on the pop-up menu.
3. Click the Play button to the left of the pop-up menu.
The notes received from the MIDI file are now played back with the settings of the track preset applied.

⇒ The recently used MIDI files are kept on the menu, for quick access. To remove an entry from this list, select it on the menu and then select “Remove MIDI File”.

Previewing presets using the Memo Recorder

The Memo Recorder function continually repeats a given sequence of notes as a loop.

To use the Memo Recorder, proceed as follows:

1. On the Sequence Mode pop-up menu, select Memo Recorder.
 2. Enter the notes via the MIDI or computer keyboard. The Play button is automatically activated and you will instantly hear the notes you play with the preset settings applied.
 - When you stop playing notes and wait for 2 seconds, the note sequence you played until this moment will be played back in a continuous loop.To use another sequence, simply start entering notes again.
- ⇒ You cannot use the Memo Recorder when previewing presets using a MIDI file.

Previewing presets via the computer keyboard

Proceed as follows:

1. Activate the “Computer Keyboard Input” button.

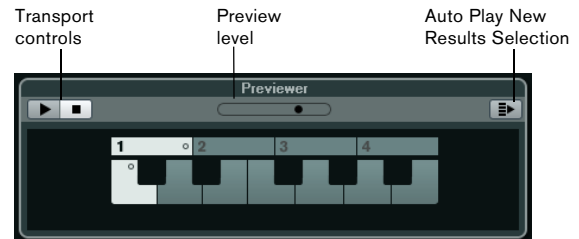
The keyboard display in the Previewer section works in the same way as the Virtual Keyboard, see [“The Virtual Keyboard \(Nuendo Expansion Kit only\)”](#) on [page 89](#).

⚠ When you activate the “Computer Keyboard Input” button, the computer keyboard is used exclusively for the Previewer sections, i.e. the usual key commands are blocked. The only exceptions are: [Ctrl]/[Command]-[S] (Save), Num [*] (Start/Stop Record), [Space] (Start/Stop Playback), Num [1] (Jump to left locator), [Delete] or [Backspace] (Delete), Num [/] (Cycle on/off), and [F2] (Show/Hide Transport panel).

2. Enter the notes via the corresponding keys on the computer keyboard.

Previewing pattern banks (Nuendo Expansion Kit only)

Pattern banks containing drum patterns can be created with the MIDI plug-in Beat Designer. Detailed information on the Beat Designer and its functions can be found in the chapter “MIDI effects” in the separate PDF document “Plug-in Reference”. One pattern bank contains 4 sub-banks which in turn contain 12 patterns each. In the Previewer section for a pattern bank file, a keyboard-style display allows you to select a subbank (click on a number at the top) and a pattern (click on a key).



- To preview a pattern, select the pattern bank in the Results list. In the Previewer section, choose a subbank and pattern. Then click the Play button.

Note that subbanks can contain empty patterns. Selecting an empty pattern in the Previewer section will have no effect. Patterns containing data are indicated by a circle in the upper part of the key in the display.

- “Auto Play New Results Selection” works as for audio files, see above.

Previewing clip packages



For clip packages, the same options as for audio files are available (except the selection ranges), see above. The preview of clip packages has however certain limitations. For detailed information, see [“Previewing clip packages”](#) on [page 567](#).

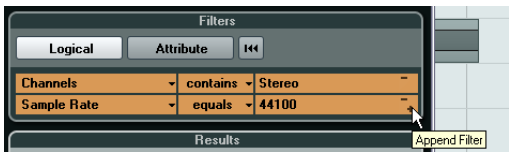
The Filters section

With the MediaBay, you can perform very refined file searches. You have two possibilities: Logical or Attribute Filtering.

⇒ You can also save your filter settings in a MediaBay Aspect, allowing for a quick recall of particular searches, see “MediaBay aspects” on page 351.

Applying a logical filter

Logical filtering is similar to working with the Logical Editor, see the chapter “The Logical Editor, Transformer, and Input Transformer” on page 431.



If you click the Logical button in the Filters section, you can set up complex conditions that must be met for files to be found. Here, you can search for a specific file attribute value, for example.

Proceed as follows:

1. In the Locations section, select the Location in which you want to search for files.
2. Activate the Logical search mode by clicking on the Logical button in the Filters section.
A condition line appears.
3. Click in the leftmost field, to open the Select Filter Attributes dialog.
The dialog shows an alphabetical list of file attributes you can choose from. At the top of the list, the MediaBay maintains an automatically generated list of the last 5 attributes selected during previous searches.
4. Select the attribute(s) you want to use, and click OK.
 - Note that you can select more than one attribute. This creates an OR condition: the files found will match either one or the other attribute.
5. Click OK to set the attribute(s) to search for.
6. On the Condition pop-up menu next to the Attribute pop-up menu, select the desired option.

The following options are available:

Option	Description
contains	The search result must contain the text or number specified in the text field to the right.
omits	The search result must not contain the text or number specified in the text field to the right.
equals	The search result must correspond exactly to the text or number specified in the text field to the right, including any file extension. Text searches are not case-sensitive.
>=	The search result must be higher than or equal to the number specified in the field to the right.
<=	The search result must be lower than or equal to the number specified in the field to the right.
is empty	Use this option to find files for which certain attributes have not been specified yet.
matches	The search result must include the text or number entered in the text field to the right. You can also use boolean operators. This allows for a very advanced text search, see “Performing a text search” on page 340.
range	When “range” is selected, you can specify a lower and an upper limit for the search result in the fields to the right.

7. Enter the text or number you are looking for in the field to the right.

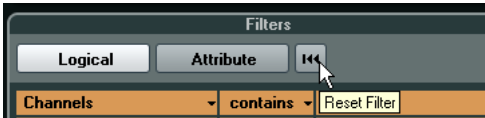
The Results list is automatically updated, showing only the files that correspond to your search conditions.

⇒ For all conditions except “range”, you can enter more than one string in the text field (separate the different search strings with a space). These strings form an AND condition, i.e. the files that are found will match all the strings entered in the field.

- To add another filter line, click the “+” button to the right of the text field.

This way, you can add up to five filter lines in which you can define further search conditions. Note that two or more filter lines form an AND condition, i.e. the files searched for must match the conditions defined in all filter lines. Click the “-” button for a filter line to remove it.

- To reset all search fields to their default settings, click the Reset Filter button in the top right corner of the Filters section.



Advanced text search

You can also perform very advanced text searches using boolean operators. Proceed as follows:

1. Select the desired location.
2. Activate Logical filtering by clicking on the Logical button at the top of the Filters section.
3. Select the desired attribute on the Attributes pop-up menu, or leave the setting on “Any Attribute”.
4. Make sure that the condition is set to “matches”.
5. Specify the desired text in the field to the right using boolean operators.

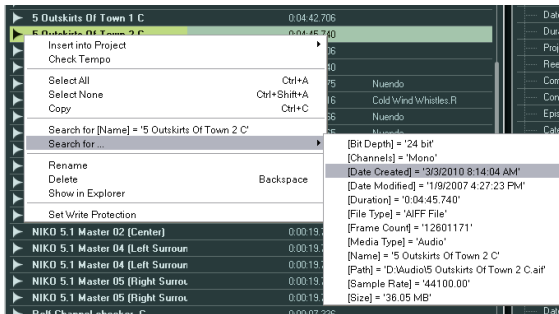
The available options are described in the section [“Performing a text search”](#) on [page 340](#).

Performing a context menu search

If you have selected a file in the Results list or the Attribute Inspector, which contains an attribute you are interested in, there is a very fast way to look for other files with the same attribute.

Right-click the selected file to open the context menu and select the attribute value from the “Search for...” sub-menu. This way you can easily find all the files that have this value in common, for example if you want to view all files that were created on the same day.

⇒ This is the same as specifying a logical search string, see above. When you select any of the “Search for...” options, the Filters section automatically switches to Logical filtering and the corresponding filter condition line is displayed. To return to the previous settings, click the Go Back button in the Filters section.



Applying an attribute filter

Filters					
Logical		Attribute			
Media Type	Category	Tempo	Channels	Sample Rate	Rating
Audio	Accordion	59.00	Mono	44100.00	***
ClipPackage	Bass	72.00	Stereo	48000.00	
Folders	Brass	76.10	4 Channels		
Mid	Drum/Perc	94.00	6 Channels		

The MediaBay allows you not only to view and edit some of the standard file attributes found in all computer files, but it also provides preconfigured attributes, or “tags”, that you can use to organize your media files, see [“The Attribute Inspector”](#) on [page 347](#).

If you click the Attribute button, the Filters section displays all values found for a specific attribute. Selecting one of these values will result in a list of files all showing this particular attribute value. For example, you could look for sample rates and pick 44.1 kHz to give you a list of all files with that particular sample rate.

The advantages of the use of attributes become obvious when having to find a specific file in a large database, without knowing the name of that file.

When you activate Attribute filtering, the Filters section shows attribute columns, each with its own list of attribute values. If the columns are wide enough, the number of files that match this criteria is displayed to the right of the filter name.

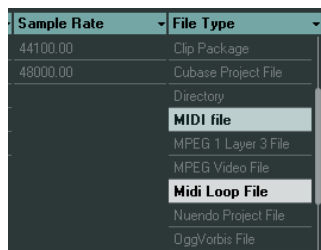
You define an Attribute filter by clicking on the values in an attribute column: only the files that match the selected attribute values are then shown in the Results list. Select more attribute values from other columns to further refine your filter.

⚠ Some attributes are directly linked to each other (e.g. for each Category value, there are certain Sub Category values available). Changing the value in one of these attribute column will give you different values in the other column!

⚠ Each attribute column displays only the attribute values found in the currently selected location! This means that selecting another location may lead to the display of different attributes.

- Selected attribute values in the same column form an OR condition.

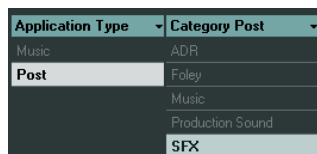
This means that files must be tagged according to either one or the other attribute value to be displayed in the Results list.



⇒ Note that this is not true for the Character attribute, which always forms an AND condition, see below.

- Attribute values in different columns form an AND condition.

This means that files must be tagged according to all these attribute values to be shown in the Results list.



Assigning attribute values to your files makes it easy to organize the media files. This is described in detail in the section [“The Attribute Inspector”](#) on [page 347](#).

⇒ You can also create user attributes (see [“Defining user attributes”](#) on [page 350](#)) to create your own categories.

Further options for Attribute searches

- You can change which attribute type is displayed in each column by clicking on the column title and selecting another attribute from the context menu.

- You can select an attribute value, by clicking on it. To deselect it, click the value again.

Note that you can select more than one value in each attribute column.

- You can clear all settings in the attribute columns by clicking the Reset Filter button at the top right of the Filters section.

Clicking this button also resets the Results list.

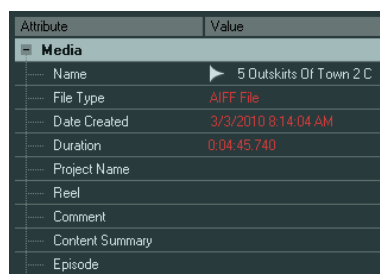
The Attribute Inspector

Attributes (or “tags”) for media files are sets of metadata providing additional information on the file.

When you have selected one or more files in the Results list, the Attribute Inspector shows a two-column list of attributes and their values. This is very handy to get a quick overview of a selected file (for example when you are stepping through the files in the Results list).

The different types of media files have different attributes: For example, for .wav audio files you will find attributes like name, length, size, sample rate, etc., while for .mp3 files, additional attributes such as artist or genre are available. In postproduction contexts, you would use attributes like Actor’s Text, Episode, Pull Factor, etc.

In this section, you can also edit the attribute values of files or enter new attribute values, see below.



The available attributes are divided into several groups (Media, Audio, Staff, etc.), so as to keep the list manageable and make it easy to find the desired element quickly.

You have access to the standard attributes and the pre-configured attributes provided by Nuendo. Additionally you can define your own attributes and add these to your files.

Attributes can be shown in the Attribute Inspector in two different ways:

- Click the Dynamic button to show all available attribute values.

This list is automatically generated by Nuendo. Use this view if you want to see the attributes the selected files have already been tagged with.

- Click the Defined button to show a configured set of attributes for the selected media type.

In this mode, you can choose which attributes are displayed (regardless of whether corresponding values are available for the selected files). For more information on how to set up the list of displayed attributes, see [“Managing the attribute lists” on page 350](#).

Editing attributes (tagging)

The search functions, especially the Attribute filter, become a truly powerful media management tool when making extensive use of tagging, i.e. when adding and editing attributes.

Media files are usually organized in complex folder structures to provide a logical way of guiding the user to the desired files, with the folder and/or file names indicating the sound, recording location, etc.

To find a particular sound or loop in such a folder structure can be very time consuming – tagging is the answer!

Editing attributes in the Attribute Inspector

In the Attribute Inspector, you can edit attribute values of the various media files. Attribute values can be chosen from pop-up lists, entered as text or numbers, or set to Yes or No.

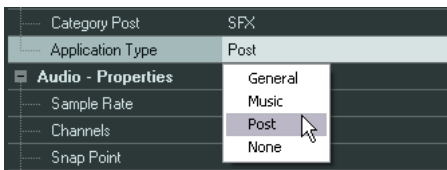
⇒ Note that changing an attribute value in the Attribute Inspector will permanently change the corresponding file (unless the file is write-protected or part of a VST Sound archive).

You can edit attributes in the following way:

1. Select the file that you want to make settings for in the Results list.

The corresponding attribute values are displayed in the Attribute Inspector.

2. Click in the Value column for the attribute.



Depending on the selected attribute, the following happens:

- For most of the attributes, a pop-up menu opens from which you can choose a value. This can be a name, a number and an on/off state. For example, this is the case for the attributes Name, Family Name, or Author.

Some of the pop-up menus also have a “more...” entry to open a window with more attribute values. These attribute selection windows also feature a Text Search button that you can use to find specific values more quickly.

- For the Rating attribute, you can click in the Value column and drag left or right to modify the setting.

- For the Character attribute (Musical group), the Edit Character dialog opens.

Click a radio button on the left or the right side and then click OK to define values for the Character attribute.

3. Set the attribute to the desired value.

- Many attribute values can also be edited by double-clicking in the Value column of the Attribute Inspector.

Simply enter/change the text or number setting in the field displayed for a value.

- To remove the attribute value from the selected files, right-click in the corresponding Value column and select “Remove Attribute” from the context menu.

- “Display only” attributes cannot be edited.

If this is the case, the file format probably does not permit changing this value, or changing a particular value makes no sense (e.g. you cannot change the file size in the MediaBay).

⇒ You can also select several files and make settings for them simultaneously (except for the name, which must be unique for every file).

About the color scheme used in the Attribute Inspector

The colors used for the displayed values in the Attributes Inspector have the following meaning:

Color	Description
White	This represents a “normal” attribute: One or more files are selected in the Results list, and they have the same values.
Yellow	Yellow color stands for an “ambiguous” attribute: Multiple files are selected in the Results list, and their values differ.
Orange	This stands for an “ambiguous static attribute”: Multiple files are selected in the Results list, with differing values, and which cannot be edited.
Red	Red values are displayed for a “static attribute”: One or more files are selected in the Results list, whose values cannot be edited.



Information on the meaning of the colors used in the Attribute Inspector are also displayed in a tooltip when you move the mouse pointer over one of the color icons below the Attribute Inspector.

Editing attributes in the Results list

You can also edit attributes directly in the Results list. This allows you for example to assign tags to a library of loop files.

⚠ This is only possible if “Allow Editing in Results List” is activated, see [“Preferences”](#) on [page 352](#).

Proceed as follows:

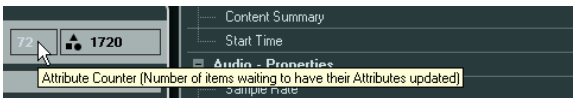
1. In the Results list, select the file(s) for which you want to change an attribute value.

2. Click in the column for the value you want to change and make the desired settings.

As in the Attribute Inspector, you can choose a value from a pop-up menu, enter the new value directly, etc.

Editing the attributes of multiple files simultaneously

There is no limit as to how many files can be tagged at the same time, but you need to be aware that the tagging of a large amount of files in one go may take quite a while. This operation is executed in the background, so that you can continue with your work as usual. By looking at the Attribute Counter above the Results list, you can see how many files still have to be updated.



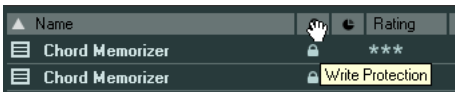
▪ If you close Nuendo before the Attribute Counter has gone down to zero, a dialog with a progress bar is displayed, indicating how long the updating process will take. You can choose to abort this process.

In this case only the files that were updated before you clicked “Abort” will have the new attribute values.

Editing the attributes of write-protected files

Media files may be write-protected due to a number of reasons: They may belong to content that was provided by someone else who write-protected the files, you may have write-protected them yourself in order not to overwrite them accidentally, or the file format could restrict write operations by the MediaBay.

In the MediaBay, the write protection status of files is shown as an attribute in the Attribute Inspector and in the Write Protection column in the Results list.



However, there may be cases when you want to define attributes for write-protected files. For example, you might want to apply attributes to the content files that came with Nuendo or you are working on the same files with several people and cannot modify these files. In these scenarios, you still want to be able to find files quickly and improve your workflow.

Therefore, it is possible to change the attribute values of write-protected files in the MediaBay. These changes are not written to disk though and occur in the MediaBay only.

- When you specify attribute values for a file that is write-protected, this is reflected in the Pending Tags column next to the Write Protection column in the Results list. Note that if you rescan the MediaBay content and a media file on your hard disk has changed since the last scan, all pending tags for this file will be lost.

- If a file has pending tags, and you want to write the corresponding attributes to the file, you need to remove the write protection first, and then select the “Write Tags to File” command from the context menu.

⇒ If the Write Protection and/or the Pending Tags column are not visible, you may have to enable the corresponding attributes for the file type in question in the Attribute Inspector.

- You can change the write-protection status of your media files, provided that the file type allows write operations and you have the necessary operation system permissions: To set or remove the write protection attribute for a file, simply select the file in the Results list and select “Set/Remove Write Protection” from the context menu.

⇒ If you use other programs than Nuendo to change the write-protection status of a file, this will not be reflected in the MediaBay until you rescan the files!

Managing the attribute lists

In the Attribute Inspector, you can define which attributes are shown in the Results list and in the Attribute Inspector itself. For different media types, individual “attribute sets” can be configured.

Proceed as follows:

1. In the Attribute Inspector, click the Defined button.
2. Click the “Configure Defined Attributes” button to the right of the Defined button.

A number of controls are displayed.

3. Click the leftmost button below the Defined/Dynamic buttons to open the “Select Media Types” dialog, activate one or more of the media types, and click OK.

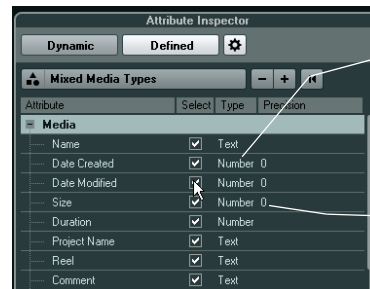
The Attribute Inspector now shows a list of all attributes available for these media types.

- If you have activated more than one media type, your settings affect all selected types. An orange checkmark indicates that the current display settings for an attribute differ for the selected media types.

- The display settings made for the Mixed Media Type option are applied whenever you select files of different media types (for example audio and MIDI files) in the Results list or the Attribute Inspector.

4. To select a certain attribute, activate the corresponding checkbox.

- You can also select several attributes and activate/deactivate their checkboxes in one go.



The Type column shows whether the value for an attribute is a number, text, or a Yes/No switch.

The Precision column shows the number of decimals displayed for number attributes.

- You can reset the display settings you made by clicking the “Reset to Default” button in the top right corner. This will reset the display settings for all media types to their default settings.

⇒ To make settings for another media type, make sure to only select this type in the list in the dialog.

5. When you have set up the attributes for all the media types you are working with, exit the Configuration mode by clicking the “Configure Defined Attributes” button again.

Defining user attributes

If you find that the available attributes are not suitable for your work, you can define your own attributes and save these in the MediaBay database and the corresponding media files.

Proceed as follows:

1. In the Attribute Inspector, activate the Defined button and click the “Configure Defined Attributes” button to enter configuration mode.

A number of controls are displayed.

2. Click the “Add User Attribute” button (the “+” sign). A dialog opens.

3. Specify the type of the attribute.

Attributes can be of the types "Text", "Number" or "Yes/No" switch. For "Number" attributes, you can specify how many decimals are displayed, by entering the corresponding value in the Precision field.

4. In the text field below, enter the name for the new attribute.

Note that this is the name as it will be displayed in the program. Below the text field, you will see the name as it will be used internally (e.g. in the MediaBay database). This way, you will see immediately if a certain name is invalid and cannot be used.

5. Click OK.

The new attribute is added to the list of available attributes and will be displayed in the Attribute Inspector and the Results list.

- To remove a user attribute, select it in the attribute list and click the "Remove User Attribute" button (the "-" sign). The attribute is removed from any attribute list.
- Nuendo recognizes all user attributes that are included in media files. For example, if you load content from another user, who has assigned his own user tags to the files, these tags are also shown in the MediaBay.

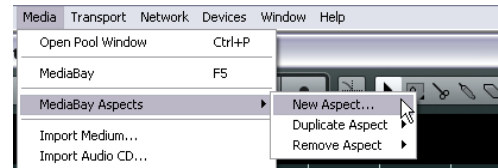
MediaBay aspects

In Nuendo, it is possible to create multiple configurations, or "aspects", of the MediaBay window, that can be recalled instantly via the Media menu. These aspects can be configured to suit your particular working situations. There might be times when you only want to work with certain sound effect files, that reside in a particular location for example. Every item in the MediaBay that can be configured (i.e. all the sections and their settings) can be part of a MediaBay aspect. This way, you can specify which sections are visible, which media types are browsed for, which locations are being scanned, and so on. It is even possible to enter a search string and save it with the aspect.

Creating a new aspect

To add a new MediaBay aspect, proceed as follows:

1. On the Media menu, open the MediaBay Aspects submenu and select "New Aspect...".



2. In the naming dialog that opens, enter the name for the new MediaBay aspect and click OK.

The new MediaBay aspect window opens.

3. You can now configure the window to your liking.

By default, new MediaBay aspects show the same sections as the default MediaBay.

⇒ You do not have to save the MediaBay aspect. It is automatically saved when you close the window (or the program).

Once an Aspect is created, it can be accessed via the Media menu.

Creating a new aspect based on an existing aspect

If you want to create a MediaBay aspect that differs only slightly from an existing aspect (e.g. if you want to specify another browse location, text string or another file type), you can base the new aspect on this existing aspect.

To do so, proceed as when creating a new Aspect (see above), but, instead of choosing "New Aspect", select the Aspect you want to use as a basis from the Duplicate Aspect submenu.

Example setup

Let's say you want to set up a MediaBay aspect for work on production sound.

Proceed as follows:

1. Create a new MediaBay aspect, from scratch or based on an existing aspect.
A naming dialog opens.
2. Enter a name for the aspect. Click OK to close the dialog.
The new MediaBay aspect opens.

3. In the Define Locations section, select the folder (or removable hard drive, etc.) containing the files with production sound you want to work with and save it as Location.
4. Hide the Define Locations section to save screen space.
5. In the Locations section, select the Location you just created.
- You can now also close this section.
6. In the Results list, specify the file type you want to browse by selecting it on the dialog.
- For example, if you only have audio files with production sound, select Audio Files.
7. Hide the Attribute Inspector.
8. In the text search field above the displayed results, enter the name of the sound or attribute you are looking for.



9. That's it! You created a MediaBay aspect.
- ⇒ By cloning this aspect and changing the name string, you can quickly and easily set up search browsers for different situations (e.g. when searching sounds for explosions, car crashes, creating monster voices).

Removing MediaBay Aspects

- To remove a MediaBay Aspect, open the Media menu, and on the MediaBay Aspects submenu, select Remove Aspect.

Preferences

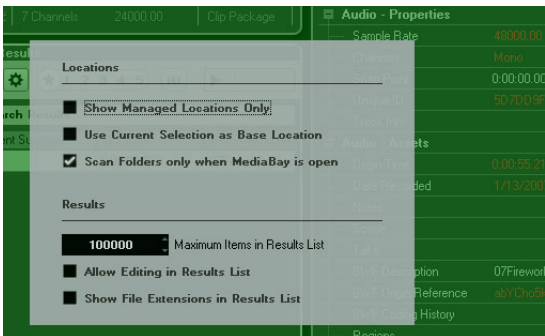
In the Preferences dialog in Nuendo, you can find options and settings that control the global behavior of the program. The Preferences dialog contains a special MediaBay page. These settings are also available from within the MediaBay.

To open the Preferences pane for the MediaBay, proceed as follows:

1. Click the MediaBay Preferences button in the lower left corner of the window.



- A transparent pane appears, covering the window. In the center of it is a gray area where the available preferences for the Locations section and the Results list are displayed.



2. Configure the MediaBay to your liking by activating/deactivating the options.

The following options are available in the Locations section:

Option	Description
Show Managed Locations Only	Activate this to hide all folders that are not scanned for files. This will keep the tree view in the Define Locations section less cluttered.

Option	Description
Use Current Selection as Base Location	Activate this to show only the selected folder and its subfolders. To switch back to the display of all folders, deactivate this option.
Scan Folders Only when MediaBay is Open	When this is activated, Nuendo only scans for media files when the MediaBay window is open. When this is deactivated, the folders are scanned in the background even when the MediaBay window is closed. However, Nuendo will never scan folders while playing back or recording.

The following options are available in the Results section:

Option	Description
Maximum Items in Results List	Use this parameter to specify the maximum number of files that are displayed in the Results list. This avoids unmanageably long lists of files. Note that the MediaBay does not warn you if the maximum number of files has been reached and there might be situations where a certain file you were looking for could not be found, because the maximum number of files was reached.
Allow Editing in Results List	When this is activated, you can also edit attributes in the Results list. When this option is deactivated, editing can only be done in the Attribute Inspector.
Show File Extensions in Results List	When this is activated, file name extensions (e.g. .wav or .cpr) are displayed in the Results list.

Key commands

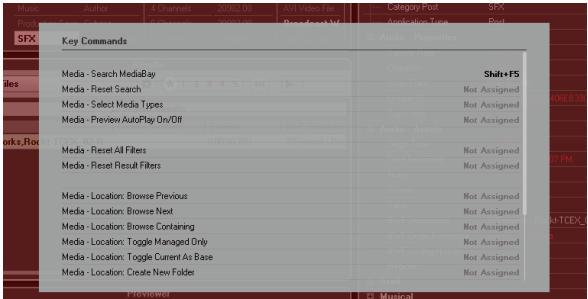
You can display the available MediaBay key commands from within the MediaBay window. This is useful if you want to get a quick overview over the assigned and the available MediaBay key commands.

To open the Key Commands pane, proceed as follows:

- 1. Click the Key Commands button in the lower left corner of the window.



A transparent pane appears, covering the window. In the center of it is a gray area where the available key commands are displayed.



- If you only want to get an overview over the key commands, you can exit the pane by clicking on its background (not in the gray area).
 - If you want to assign or modify key commands, click in the gray area.
- The Key Commands dialog opens, in which you can set up and edit key commands, see the chapter [“Key commands”](#) on [page 580](#).

Working with MediaBay-related windows

The MediaBay concept can be found throughout the program, for example when adding new tracks or when choosing presets for VST instruments or effects. The workflow in all MediaBay-related windows is the same as in the MediaBay. Below follow a few examples.

Adding tracks

When you select one of the Add Track options on the Project menu, the following dialog opens:



The Add Track dialog for audio tracks

Click the Browse button to expand the dialog to show the Results list (as you can find it in the MediaBay). However, only file types that can be used in this context are shown.



You can also apply track presets to existing tracks. The dialog that opens in this case is the same as above.

Applying effect presets

When you have added an insert effect, you can choose from a variety of presets via the Presets pop-up menu for the effect slot.

The Preset browser opens:



Applying instrument presets

When working with VST instruments, you can choose from a variety of presets via the Presets pop-up menu.

The Preset browser opens:



VST presets for instruments can be divided into two groups: “presets” containing the settings of the whole plug-in (for multi-timbral instruments, this means the settings for all sound slots as well as the global settings) and “programs” containing only the settings for one program (for multi-timbral instruments, this means only the settings for one sound slot). In the MediaBay, they can be recognized by their icons. This way, you can see directly whether a VST preset contains a single sound or more.

Icon	Description
	This preset contains settings for all loaded programs.
	This program only contains settings for the first or the selected instrument slot.

Working with Volume databases

Nuendo stores all media file information used in the MediaBay, such as paths and attributes, in a local database file on your computer. However, in some cases, it might be necessary to browse and manage this kind of metadata on an external volume. For example, a sound editor might have to work both at home and in a studio, on two different computers. Therefore, he has stored his sound effects on an external storage medium. When he is working on a different computer, he wants to connect the

external device and directly browse its contents in the MediaBay, without having to scan the device again. This can be achieved by creating a volume database for the external device.

Volume databases are files that can be created for drives of your computer or for external storage media. They contain the same kind of information about the media files on these drives as the regular MediaBay database.

Creating a volume database

To create a separate volume database file for a drive, proceed as follows:

1. In the Define Locations section of the MediaBay, select the external storage medium, drive or partition of your computer system that you want to create a database for.

⚠ You must select the topmost level (root) for this. You cannot create a database file for a lower-level folder.

2. Right-click on it and select “Create Volume Database” on the context menu.

The file information for this drive is now written into a new database file.



⚠ If the drive contains a large amount of data, this process may take a while.

When the new database file is available, this is reflected by the symbol to the left of the drive name.



For these two volumes volume databases have been created.

Volume databases are automatically mounted when Nuendo is launched. They are shown in the Define Locations section and their data can be viewed and edited in the Results list, as for the other media files in the MediaBay.

Rescanning and refreshing

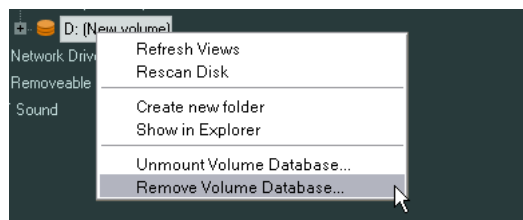
Use the Rescan and Refresh MediaBay functions for a volume database if you have modified the scan settings on a different system, for example, by activating additional folders for scanning.

Removing volume databases

When you have worked on another computer using an external hard disk and return to your own computer and connect the external device again as part of your system setup, you do not need a separate volume database for it any more. Any data on this drive can then be included in the local database file again, by removing the extra database file.

- To remove a database, right-click on it and select “Remove Volume Database” from the context menu.

This integrates the metadata in the local MediaBay database file and subsequently deletes the volume database file.



⇒ Depending on the size of the volume database, this might take a while.

Mounting and unmounting volume databases

When you launch Nuendo, all available volume databases are automatically mounted. Databases that are made available while the program is running have to be mounted manually via the command “Mount Volume Database” on the context menu. To unmount a volume database, select “Unmount Volume Database” from the context menu.

Introduction

Track presets are templates from audio, MIDI or instrument tracks that can be applied to newly created or existing tracks of the same type. They contain sound and channel settings, and allow you to quickly browse, preview, select and change sounds, or reuse channel settings across projects.

Track presets are organized in the MediaBay (see the chapter [“The MediaBay”](#) on [page 334](#)), where you can categorize them with attributes.

Types of track presets

There are four kinds of track presets (audio, instrument, MIDI and Multi) and two kinds of VST presets (VST instrument presets and VST effect plug-in presets). These are described in the following sections.

⇒ Track preset settings for volume, pan, input gain and input phase will be applied only when creating a new track from a track preset.

Audio track presets

Track presets for audio tracks include all settings that define the sound. You can use the factory presets as a starting point for your own editing and save the audio settings that you optimized for an artist you often work with as a preset for future recordings.

The following data is saved in audio track presets:

- Insert effects settings (including VST effect presets)
- EQ settings
- Volume + pan
- Input gain + phase

Instrument track presets

Instrument track presets offer both MIDI and audio features and are the best choice when handling sounds of simple, mono-timbral VST instruments. Use instrument track presets for auditioning your tracks, or saving your preferred sound settings, for example. You can also extract sounds from instrument track presets for use in instrument tracks, [“Extracting sound from an instrument track or VST preset”](#) on [page 360](#).

The following data is saved in instrument track presets:

- Audio insert effects
- Audio EQ
- Audio volume + pan
- Audio input gain + phase
- MIDI insert effects
- MIDI track parameters
- Input Transformer settings
- The VST instrument used for the track
- Staff settings
- Color settings
- Drum map settings

MIDI track presets

MIDI tracks should be used for multi-timbral VST instruments and external instruments. When creating MIDI track presets you can either include the currently set channel, or the currently set patch. See [“Creating a track preset”](#) on [page 360](#) for details.

- To ensure that saved MIDI track presets for external instruments will work again with the same instrument, install the instrument as a MIDI device, see the separate PDF document [“MIDI Devices”](#).

The following data is saved in MIDI track presets:

- MIDI modifiers (Transpose, etc.)
- MIDI inserts (FX)
- Output + Channel or Program Change
- Input Transformer settings
- Volume + pan
- Staff settings
- Color settings
- Drum map settings

Multi-track presets

You can use multi-track presets, for example, when recording setups that require several microphones (a drum set or a choir, where you always record under the same conditions) and you have to edit the resulting tracks in a similar way. Furthermore, they can be used when working with layered tracks, where you use several tracks to generate a certain sound instead of manipulating only one track.

If you select more than one track when creating a track preset, the settings of all selected tracks will be saved as one multi-track preset. Multi-track presets can only be applied if the target tracks are of the same type, number and sequence as the tracks in the track preset, therefore, they should be used in recurring situations with very similar tracks and settings.

VST (instrument) presets

VST instrument presets (extension “.vstpreset”) behave like instrument track presets and contain a VST instrument and its settings but no modifiers, MIDI inserts, inserts or EQ settings. You can extract sounds from VST presets for use in instrument tracks, see [“Extracting sound from an instrument track or VST preset”](#) on [page 360](#).

The following data is saved in VST instrument presets:

- VST instrument
- VST instrument settings

VST effect plug-ins are available in VST3 and VST2 format. Presets for these effects are also saved as VST presets. These that can be part of audio track presets (see [“Audio track presets”](#) on [page 357](#)).

⇒ In this manual, “VST presets” stands for VST3 instrument presets, unless stated otherwise.

Pattern banks (Nuendo Expansion Kit only)

Pattern banks are presets created for the Beat Designer MIDI effect. They behave much like track presets. For detailed information, see [“Previewing pattern banks \(Nuendo Expansion Kit only\)”](#) on [page 344](#) and the chapter “MIDI effects” in the separate PDF document “Plug-in Reference”.

Applying track presets

When you apply a track preset, all the settings saved in the preset are applied. Track presets can be applied to tracks of their own type only, i.e. audio track presets to audio tracks, etc. The only exception are instrument tracks: for these, VST presets are also available. Note that applying VST presets to instrument tracks leads to removal of modifiers, MIDI inserts, inserts, or EQs, since these settings are not stored in VST presets.

⚠ Once a track preset is applied, you cannot undo the changes! It is not possible to remove an applied preset from a track and return to the previous state. If you are not satisfied with the track settings, you have to either edit the settings manually or apply another preset.

Applying track or VST presets via drag and drop

1. Open the MediaBay from the Media menu.



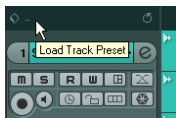
2. Select a MIDI or instrument track preset, or a VST preset.
3. Preview the preset using the functions in the Previewer section (for further information, see [“Previewing files”](#) on [page 342](#)).
4. Drag and drop it onto a track of the same type.

⇒ You can also drag and drop track presets from the Windows Explorer or the Mac OS Finder, but in this case, no preview for track presets is possible.

Loading track or VST presets in the Inspector or the context menu of the track

1. In the Project window, select a track.
2. Click in the Load Track Preset field at the top of the Inspector (above the track name) or right-click the track in the track list and select “Load Track Preset”.

The Presets browser opens.



Click here...

...to open the Presets browser.



3. Select a track or VST preset from the Results list.
- If needed, filter the list by activating the attributes you are looking for in the Filters section. This section is similar to the Filters section in the MediaBay, see [“The Filters section”](#) on [page 335](#).

4. Start playback to preview the selected audio, MIDI, instrument track, or VST preset.

All settings from the track preset are applied in realtime to the selected track. If you set up your target track to a cycle and play back in loop, previewing will be very comfortable. Note that you cannot preview multi-track presets.

5. When you have found the preset that you want, double-click on it (or click outside the Presets browser).
- The preset is applied.

- To return to the preset that was selected when you opened the Presets browser, click the “Revert to Last Setting” button.

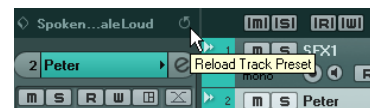
Applying a multi-track preset

1. Select several tracks in your project.
- Multi-track presets can only be applied if track type, number, and sequence are identical for the selected tracks and the track preset.
2. Right-click the track to open the context menu and select “Load Track Preset”.
- The Presets browser opens. Only multi-track presets corresponding to the selection of tracks in the project are shown.
3. Select a multi-track preset from the Results list.
 4. When you have found the preset that you want, double-click on it (or click outside the Presets browser).
- The preset is applied.

- To return to the preset that was selected when you opened the Presets browser, click the “Revert to Last Setting” button.

Reloading track or VST presets

When you have modified the settings of a track or VST preset and are not satisfied with the results, you can revert to the default settings of the preset by clicking the “Reload Track Preset” button.



Applying inserts and EQ settings from track presets

Instead of handling complete track presets, it is also possible to apply insert or equalizer settings from track presets.

Proceed as follows:

1. Select the desired track, open the Inspector or the Channel Settings window and click the VST Sound button on the Inserts or Equalizers tab/section.
- The Preset Management pop-up menu opens.
2. On the pop-up menu, select “From Track Preset...”.
- The Presets browser opens, showing all available track presets that contain inserts or EQ settings.
3. Select a track preset and click outside the browser.

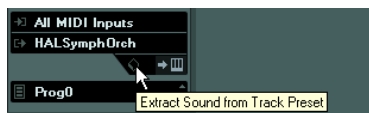
For information on the general handling of inserts presets, see [“Effect presets”](#) on [page 209](#). The general handling of EQ presets is described in the section [“Using EQ presets”](#) on [page 166](#).

Extracting sound from an instrument track or VST preset

For instrument tracks, you can extract the “sound” of an instrument track preset or VST preset, that means the VST instrument and its settings.

Proceed as follows:

1. Select the instrument track to which you want to apply a sound.
2. Click the VST Sound button below the Output Routing field in the Inspector.



The Presets browser opens, showing a list of all available presets.

3. Select an instrument track preset or VST preset by double-clicking on it.

The VST instrument and its settings (but no inserts, EQs, or modifiers) on the existing track are overwritten with the data of the track preset. The previous VST instrument for this instrument track is removed and the new VST instrument with its settings is set up for the instrument track.

⇒ The VST instrument of an instrument track is not listed in the VST Instruments window. It only appears in the Plug-In Information window, see [“The Plug-in Information window”](#) on [page 213](#).

Creating a track preset

A track preset can be created from an existing audio, MIDI, or instrument track – or a combination of these.

Proceed as follows:

1. In the Project window, select one or more tracks. If several tracks are selected, all of them are stored in one combined multi-track preset, see [“Multi-track presets”](#) on [page 357](#).
2. Right-click one of the selected tracks in the track list and select “Save Track Preset” from the context menu. The Save Track Preset dialog opens.



3. In the New Preset section, enter a name for the new preset.

The track preset file name extension .trackpreset is assigned automatically.

- If you want to save attributes for the preset, click the button below the “New Preset” section at the bottom left. The Attribute Inspector section opens, allowing you to define attributes for the preset. For further information about attributes, see [“The Attribute Inspector”](#) on [page 347](#).
 - If you create a track preset for a MIDI track, you can decide whether you want to include the MIDI channel or the MIDI patch. Select “Include MIDI channel” when working with a pre-configured multi-timbral external instrument (for example, a sampler). That way the correct channel will be called up. Select “Include MIDI Patch” when working with a multi-timbral external instrument (e.g. a MIDI expander), where all sounds are available on all channels so that the sounds (patches) can be changed on the fly.
4. Click OK to save the preset and exit the dialog.

Track presets are saved within the application folder in the “Track Presets” folder (in default subfolders named according to their track type: audio, MIDI, instrument, and multi).

⇒ You cannot change the default folders, but you can add further subfolders (by clicking the New Folder button).

In the MediaBay all presets are available under the (virtual) VST Sound node, see [“The VST Sound node”](#) on [page 337](#).

⇒ If you want to use a MIDI track preset for a pre-configured VST instrument setup, load the VST instrument(s) in the VST Instruments window, select a VST instrument patch, save the track preset, and do not change the patch afterwards. To ensure this, use a template project with the VSTi setup included and save the sounds (track presets) of this template project in specific subfolders, as they only work within this setup.

Creating tracks from track presets or VST presets

Using drag and drop

1. Open the MediaBay from the Media menu.
2. Select a track or VST preset from the list of all presets.
3. Start playback to preview the selected VST preset.

All settings are applied in realtime to the selected track. If you set up your target track to a cycle and play back in loop, previewing will be very comfortable. Note that you cannot preview multi-track presets.

4. Drag and drop the preset onto the track list in the Project window.

One or more (in case of multi-track presets) tracks are created. If you drag and drop a VST instrument preset, an instrument track is created.

⇒ You can also drag and drop from the Windows Explorer or the Mac OS Finder, but in this case, no preview for MIDI and instrument track presets is possible.

Using the Choose Track Preset dialog

1. Right-click the track list to open the context menu and on the Add Track submenu select “Add Track Using Track Preset...”.

The Choose Track Preset dialog opens, showing a list of the available presets.

2. Select a preset from the Results list.

The Results section of the Choose Track Preset dialog displays all preset sounds for all track types and VST instruments.


- Using the Filters section, you can narrow down the list by selecting the attributes that you are looking for. This section is similar to the Filters section in the MediaBay, see [“The Filters section”](#) on [page 335](#).

- Open the Location Tree section to select the folder in which you want to look for presets.

To show the Location Tree section, click the “Set Up Window Layout” button and activate the Location Tree option.

3. To preview MIDI and instrument track presets or VST presets, you have to play MIDI notes on a MIDI keyboard or load a MIDI file because there is no track connected.

The previewing options are described in detail in the section [“Previewing VST presets and track presets for MIDI and instrument tracks”](#) on [page 343](#).

-  The Preview functions work in the same way in the MediaBay and its related dialogs. Note however that not all Preview functions available in the MediaBay are also available in the dialogs.

4. When you have found the right preset, click the Add Track button to close the dialog.

One or more tracks (in case of multi-track presets) are created.

Using the Add Track function

1. Right-click the track list and select one of the Add Track options on the context menu.

2. Click the Browse button to expand the Add Track dialog.

The Presets Browser opens. The options are the same as when applying a preset to an existing track, see [“Loading track or VST presets in the Inspector or the context menu of the track”](#) on [page 359](#). The view is filtered to show only the corresponding track presets.

3. Select a track or VST preset.

4. Click the Add Track button to create the track.

⇒ This method is not available for multi-track presets.

Introduction

Nuendo can give you instant access to up to eight parameters of each audio, MIDI or instrument track. This is done with the aid of the so-called quick controls, set up on the Quick Controls Inspector tab for these tracks.

The Quick Controls tab can be used as a kind of track control center, an area in which your most important parameters are assembled in one place. This saves you from having to click your way through the various windows and sections pertaining to your track.

Also, Nuendo allows you to assign these quick controls very quickly to an external remote control device. This gives you manual control of your most important track parameters.

Setting up the Quick Controls tab

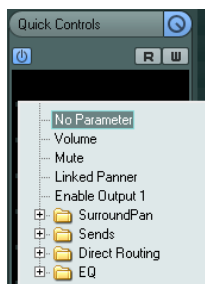
Assigning parameters to quick controls

The Quick Controls tab shows eight slots, one for each quick control. To start with, these slots are empty.

Proceed as follows to assign track parameters to the quick control slots:

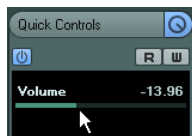
1. On the Quick Controls tab, click on the first quick control slot.

A context menu opens. It lists all parameters currently accessible for this particular track.



2. Double-click the parameter that you want to assign to the first quick control slot.

The parameter name and its value are displayed in the slot. You can change the value by dragging the slider.



The track's main volume parameter is assigned to quick control 1.

3. Repeat these steps for each quick control slot until all eight slots are associated with track parameters.

You can now control the 8 functions most important to you via one single Inspector section.

Editing the quick control slots

- To rename a quick control, double-click on the name in the slot to select it, enter a new name and press [Enter].
- To replace a parameter assignment with a different parameter, click on the corresponding quick control slot and double-click on a different parameter in the browser pop-up menu list.

The parameter assignment in this slot is changed.

- To remove a parameter from a slot, double-click the parameter name to select it and press the [Delete] or [Backspace] key. Confirm this operation by pressing [Enter] or click in the corresponding slot and select "No parameter" from the browser pop-up menu.

The parameter assignment is removed, and the quick control slot is empty.

Options and settings

- Quick control assignments are saved with the current project.
- Since quick control settings are part of the track setup, you can save them as track presets, allowing you to re-use your settings across different projects.

Track presets are described in the chapter ["Working with track presets"](#) on [page 356](#).

- You can automate all parameter settings on the Quick Controls tab using the Read/Write Enable buttons (R and W) at the top right.

The automation features of Nuendo are described in detail in the chapter ["Automation"](#) on [page 239](#).

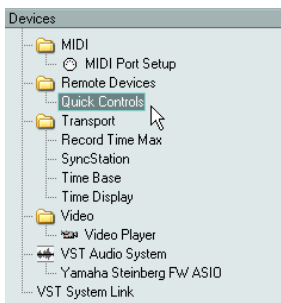
Setting up quick controls on an external remote controller

Quick controls become really powerful when used in combination with a remote controller.

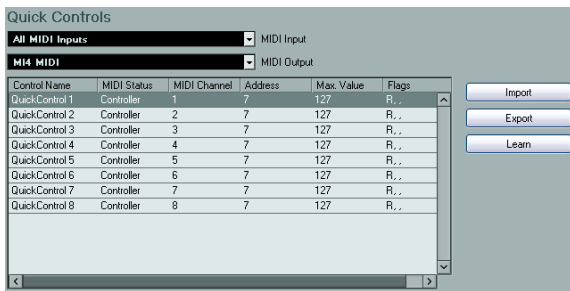
Setting up the connection between the slots on the Quick Controls Inspector tab and a remote control device is easy.

Proceed as follows:

1. In Nuendo, open the Device Setup dialog from the Devices menu.
2. In the Devices list on the left, select the Quick Controls option.

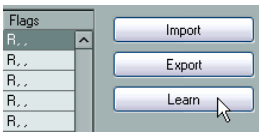


This will open the Quick Controls section on the right of the dialog:



3. With your remote control device connected to Nuendo via MIDI, select the corresponding MIDI port on your computer in the MIDI Input pop-up (or select "All MIDI Inputs"). If your remote controller has its own MIDI input and supports MIDI feedback, you can connect your computer to the device input. Then, select the corresponding MIDI port in the MIDI Output pop-up menu.
4. Click "Apply" to apply your settings.

5. Select "QuickControl1" in the "Control Name" column.
6. Move the control (knob, fader or other) on your remote control device that you want to use for the first quick control.
7. In the Device Setup dialog, click the Learn button.



8. Repeat the last 3 steps for the other quick controls.

You have now associated the slots on the Quick Control tab with control elements on your external remote controller. Moving a control element will automatically change the value of the parameter assigned to the corresponding quick control.

- The remote controller setup for quick controls is saved globally, i.e. independent of any projects.

If you have various remote controllers, you can store and load several quick control setups using the Export and Import buttons.

Quick controls and automatable parameters

The quick controls feature has one special extension: you can use quick controls not only to access certain parameters of the current track, but also to control all automatable parameters. This makes it possible to use the Quick Controls tab of a dedicated track as a kind of "mini mixer", controlling parameters on other tracks. Use this function with caution, however, as you might accidentally modify parameters on other tracks.

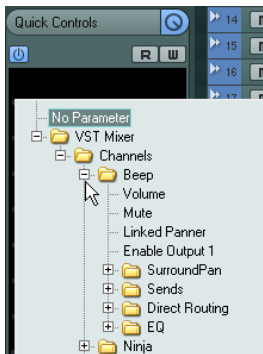
Proceed as follows:

1. Create a new, empty audio track and open its Quick Controls tab.
2. Hold down the [Ctrl]/[Command] key and click on the slot for quick control 1.

This track has no events or parts.

The parameter selection context menu opens, but it lists not the parameters of the current track, but all automatable parameters.

3. Open the VST Mixer folder.



The pop-up menu lists all channels available in the Mixer of your current project.

4. Now assign a parameter of one particular channel to quick control 1, and another parameter of another channel to quick control 2.



Here, quick controls 1–8 have been set up to control the main volume of eight audio tracks.

The Quick Controls tab has become a “secondary” mixer, dedicated to quick-controlling parameters on other tracks.

⚠ Quick controls that are assigned that way cannot work when saved as track presets.

Introduction

It is possible to control Nuendo via MIDI. A large number of MIDI control devices is supported. This chapter describes how to set up Nuendo for remote control. The supported devices are described in the separate PDF document “Remote Control Devices”.

- There is also a Generic Remote Device option, allowing you to use any MIDI controller to remote control Nuendo. How to set this up is described in the section [“The Generic Remote device”](#) on [page 369](#).

Setting Up

Connecting the remote device

Connect the MIDI output on the remote unit to a MIDI input on your MIDI interface. Depending on the remote unit model, you may also need to connect a MIDI Out on the interface to a MIDI In on the remote unit (this is necessary if the remote unit features “feedback devices” such as indicators, motorized faders, etc.).

If you are recording MIDI tracks, you do not want any MIDI data from the remote unit to be accidentally recorded as well. To avoid this, you should make the following setting:

1. Open the Device Setup dialog from the Devices menu.
2. Select “MIDI Port Setup” in the list on the left.
3. Check the table on the right and locate the MIDI input to which you have connected the MIDI remote unit.
4. Deactivate the checkbox in the “In ‘All MIDI Inputs’” column for that input, so that the State column reads “Inactive”.
5. Click OK to close the Device Setup dialog.

Now you have removed the remote unit input from the “All MIDI Inputs” group. This means that you can record MIDI tracks with the “All MIDI Inputs” port selected without risking to record the data from the remote unit at the same time.

Selecting a remote device

1. Open the Device Setup dialog from the Devices menu.
2. If you cannot find the remote device you are looking for, click on the plus sign in the top left corner and select the device from the pop-up menu.

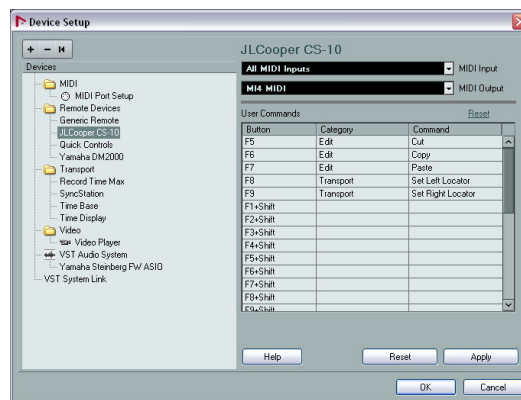
The selected device is added to the Devices list.

- Note that it is possible to select more than one remote device of the same type.

If you have more than one remote device of the same type, these will be numbered in the Devices list. For example, to be able to use a Mackie Control Extender, you must install a second Mackie control device.

3. Select your MIDI control device model from the Devices list.

Depending on the selected device, either a list of programmable function commands or a blank panel is shown in the right half of the dialog window.

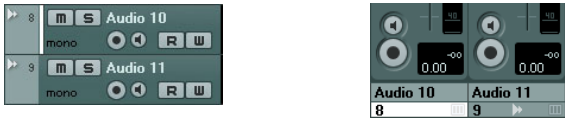


4. Select the correct MIDI input from the pop-up menu. If necessary, select the correct MIDI output from the pop-up menu.


5. Click OK to close the dialog.

You can now use the MIDI control device to move faders and knobs, activate Mute and Solo, etc. The exact parameter configuration depends on which external MIDI control device you are using.

- In the Project window (track list) and the Mixer (bottom of channel strips) you will now see white stripes indicating which channels are currently linked to the remote control device.



Audio 10 can be remote controlled, while Audio 11 is not linked to the remote control device.

-  Sometimes communication between Nuendo and a remote device is interrupted or the handshaking protocol fails to create a connection. To re-establish communication with any device in the Devices list, select it and click the Reset button in the lower part of the Device Setup dialog. The “Send Reset Message to all Devices” button at the top left of the dialog next to the “+” and “-” buttons will reset every device in the Devices list.

Operations

Global options for remote controllers

In the Device Setup dialog, on the page for your remote device, some (or all) of the following global functions may be available (depending on your remote device):

Option	Description
Bank pop-up menu	If your remote device contains several banks, you can select the bank you want to use. The bank you select here is used by default when Nuendo is launched.
Smart Switch Delay	Some of the Nuendo functions (e.g. Solo and Mute) support the so called “smart switch” behavior: In addition to regular activation/deactivation of a function by clicking a button, you can also activate the function for as long as the button is pressed. Upon releasing the mouse button, the function is deactivated. This pop-up menu allows you to specify how long a button must be pressed before it goes into “smart switch” mode. When “Off” is selected, the “smart switch” function is deactivated in Nuendo.
Enable Auto Select	If this option is activated, touching a fader on a touch-sensitive remote control device automatically selects the corresponding channel. On devices without touch-sensitive faders, the channel gets selected as soon as you move the fader.

Writing automation using remote controls

Automating the Mixer in Touch mode using a remote control device is done in the same way as when you operate on-screen controls in Write mode. In order to replace existing automation data for a control in Touch mode, the computer needs to know how long the user actually “grabbed” or used the control. When doing this “on screen”, the program simply detects when the mouse button is pressed and released. When you are using an external remote control device without touch-sensitive controls, Nuendo cannot tell whether you “grab and hold” a fader or simply move it and release it.

Therefore, when you are using a device without touch-sensitive controls and want to replace existing automation data, pay attention to the following:

- If you activate Write mode and move a control on the remote control device, all data for the corresponding parameter is replaced from the position where you moved the control, up to the position where playback is stopped. In other words, as soon as you move a control in Write mode, it remains “active” until you stop playback.
- Make sure that you move only the controller you want to replace.

Assigning remote key commands

For some remote devices, you can assign any Nuendo function (to which a key command can be assigned) to generic buttons, wheels, or other controls.

Proceed as follows:

1. Open the Device Setup dialog and select your remote device.
On the right side of the window you will find a three column table. This is where you assign commands.
2. Use the Button column to locate a remote device control or button to which you wish to assign a Nuendo function.
3. Click in the Category column for the control and select one of the Nuendo function categories from the pop-up menu.
4. Click in the Command column and select the desired Nuendo function from the pop-up menu.
The available items on the pop-up menu depend on the selected category.
5. Click “Apply” when you are done.

- Click “Reset” to revert to the default settings.

The selected function is now assigned to the button or control on the remote device.

A note about remote controlling MIDI tracks

While most remote control devices will be able to control both MIDI and audio channels in Nuendo, the parameter setup may be different. For example, audio-specific controls (such as EQ) will be disregarded when controlling MIDI channels.

Accessing user panel parameters via remote control devices

Nuendo allows you to control external MIDI devices through user device panels. When you have assigned project parameters to a device panel to be displayed in the Mixer (i.e. when creating the panel, you must select the Channel Strip Size option in the Add Panel dialog), you can access these parameters through some of the remote control devices supported by Nuendo.

This feature is supported for the following devices:

- Steinberg Houston
- Mackie Control
- Mackie HUI
- Yamaha DM 2000
- CM Motormix
- SAC2K

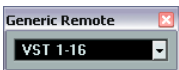
These remote control devices provide an extra display page in the Inserts section for the selected channel.

This page is called User and is displayed as the 9th insert page for audio channels and as the 5th insert page for MIDI channels. It allows you to control the parameters assigned to your user device panel from your remote control device.

The Generic Remote device

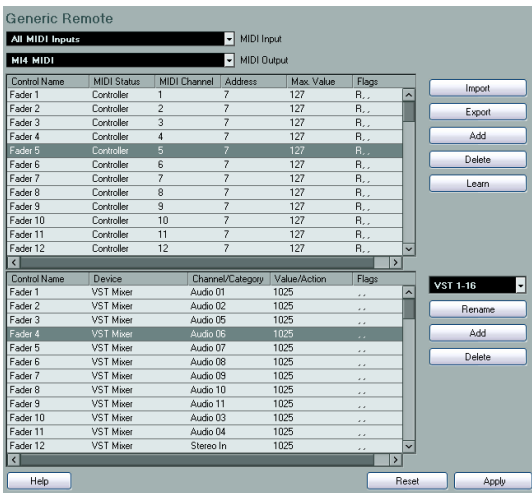
If you have a generic MIDI controller, you can use this for remote control of Nuendo by setting up the Generic Remote device:

1. Open the Device Setup dialog on the Devices menu. If the Generic Remote device is not on the Devices list, you need to add it.
 2. Click the “+” sign in the top left corner and select the “Generic Remote” device from the pop-up menu.
- When the Generic Remote device is added in the Device Setup dialog, you can open the corresponding window by selecting “Generic Remote” from the Devices menu.



3. Select the Generic Remote device in the Devices list to the left.

The settings for the Generic Remote device are displayed, allowing you to specify which control on your device should control which parameter in Nuendo.



4. Use the MIDI Input and Output pop-up menus to select the MIDI port(s) to which your remote device is connected.

5. Use the pop-up menu to the right to select a bank.

Banks are combinations of a certain number of channels, and are used because most MIDI devices can control only a limited number of channels at a time (often 8 or 16). For example, if your MIDI control device has 16 volume faders, and you are using 32 Mixer channels in Nuendo, you would need two banks of 16 channels each. When the first bank is selected you can control channel 1 to 16; when the second Bank is selected you can control channel 17 to 32.

6. Set up the table at the top according to the controls on your MIDI control device.

The columns have the following functionality:

Column	Description
Control Name	Double-clicking this field allows you to enter a descriptive name for the control (typically a name written on the console). This name is automatically reflected in the Control Name column in the lower table.
MIDI Status	Clicking in this column pulls down a pop-up menu, allowing you to specify the type of MIDI message sent by the control. The options are Controller, Program Change, Note On, Note Off, Aftertouch, and Polyphonic Pressure. Also available are Continuous Control NRPN and RPN, a way to extend the available control messages. The "Ctrl JLCoo-per" option is a special version of a Continuous Controller where the 3rd byte of a MIDI message is used as address instead of the 2nd byte (a method supported by various JLC-Cooper remote devices).
MIDI Channel	Clicking in this column opens a pop-up menu, allowing you to select the MIDI channel on which the controller is transmitted.
Address	The Continuous Controller number, the pitch of a note, or the address of a NRPN/RPN Continuous Controller.
Max. Value	The maximum value the control will transmit. This value is used by the program to "scale" the value range of the MIDI controller to the value range of the program parameter.
Flags	Clicking in this column pulls down a pop-up menu, allowing you to activate or deactivate three flags: Receive – activate this if the MIDI message should be processed on reception. Transmit – activate this if a MIDI message should be transmitted when the corresponding value in the program changes. Relative – activate this if the control is an "endless" rotary encoder, which reports the number of turns instead of an absolute value.

- If you find that the table at the top holds too many or too few controls, you can add or remove controls with the Add and Delete buttons to the right of the table.

- If you are uncertain of which MIDI message a certain controller sends, you can use the Learn function.

Select the control in the upper table (by clicking in the Control Name column), move the corresponding control on your MIDI device and click the Learn button to the right of the table. The MIDI Status, MIDI Channel, and Address values are automatically set to those of the moved control.

7. Use the table at the bottom to specify which Nuendo parameters you want to control.

Each row in the table is associated to the controller in the corresponding row in the first table (as indicated by the Control Name column). The other columns have the following functionality:

Column	Description
Device	Clicking in this column opens a pop-up menu, used for determining which device in Nuendo is controlled. The special "Command" option allows you to perform certain command actions by remote control. One example of this is the selection of remote banks.
Channel/Category	This is where you select the channel to be controlled or, if the "Command" Device option is selected, the Command category.
Value/Action	Clicking in this column pulls down a pop-up menu, allowing you to select the parameter of the channel to be controlled (typically, if the "VST Mixer" Device option is selected, you can choose between volume, pan, send levels, EQ, etc.). If the "Command" Device option is selected, this is where you specify the "Action" of the category.
Flags	Clicking in this column pulls down a pop-up menu, allowing you to activate or deactivate three flags: Push Button – When activated, the parameter is only changed if the received MIDI message shows a value unequal to 0. Toggle – When activated, the parameter value is switched between minimum and maximum value each time a MIDI message is received. The combination of Push Button and Toggle is useful for remote controls which do not latch the state of a button. One example is controlling mute status with a device on which pressing the Mute button turns it on, and releasing the Mute button turns it off. If Push Button and Toggle are activated, the Mute status will change between on and off whenever the button is pressed on the console. Not Automated – When activated, the parameter will not be automated.

8. If necessary, make settings for another bank.

Note that you only need to make settings in the bottom table for this bank. The table at the top is already set up according to the MIDI remote device.

- If necessary, you can add banks by clicking the Add button below the Bank pop-up menu.

Clicking the Rename button allows you to assign a new name to the currently selected bank, and you can remove an unneeded bank by selecting it and clicking the Delete button.

9. When you are finished, close the Device Setup window.

Now, you can control the specified Nuendo parameters from the MIDI remote device. To select another bank, use the pop-up menu in the Generic Remote window (or use a control on the MIDI remote device, if you have assigned one for this).

Importing and exporting remote setups

The Export button in the top right corner of the Generic Remote Setup window allows you to export the current setup, including the Control configuration (the table at the top) and all banks. The setup is saved as a file (with the file extension “.xml”). Clicking the Import button allows you to import saved remote setup files.

⇒ The last imported or exported remote setup will automatically be loaded when the program starts or the Generic Remote control is added in the Device Setup dialog.

Track Quick Controls

If you have an external remote control device, you can set it up to control up to eight parameters of each audio track, MIDI track or instrument track, using the Track Quick Controls feature in Nuendo. How to set up your device and how to assign parameters to it is described in the chapter “Track Quick Controls” on [page 362](#).

Deactivating joysticks

When you have a joystick connected to your system, but do not want to use it with Nuendo, you can deactivate it:

1. Open the Device Setup dialog from the Devices menu.
2. Select the device in the list to the left in the dialog. The corresponding settings are shown to the right.
3. You can now activate/deactivate the joystick by activating or deactivating the respective dialog option.

Apple Remote (Macintosh only)

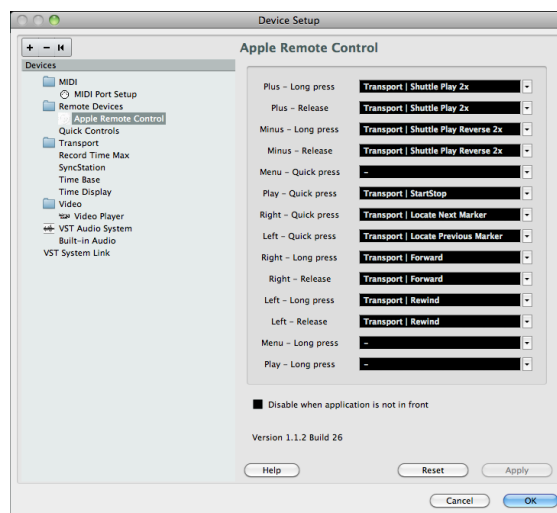
Many Apple computers come with an Apple Remote Control, a small hand-held device akin to TV remote controls. It allows you to remotely control certain features in Nuendo.

Proceed as follows:

1. Open the Device Setup dialog and select Apple Remote Control from the Add Device pop-up menu.

2. In the list on the right, the Apple Remote's buttons are listed. For each button you can open a pop-up menu from which you can select a Nuendo parameter.

The parameter you select is assigned to the corresponding button on the Apple Remote.



By default, the Apple Remote always controls the application that currently has the focus on your Macintosh computer (provided that this application supports the Apple Remote).

- When the “Disable when application is not in front” option is not selected, the Apple Remote will control Nuendo even if it does not have the focus.

Introduction

For each MIDI track, you can set up a number of track parameters, or modifiers, and MIDI effects. These affect how the MIDI data is played back, “transforming” MIDI events in realtime before they are sent to the MIDI outputs.

On the following pages, the available parameters and effects are described. Keep in mind:

- The actual MIDI events will not be affected – the changes happen “on the fly”.
- Since the modifier settings do not change the actual MIDI data on the track, they will not be reflected in the MIDI editors. To convert the track settings into “real” MIDI events, use the Freeze MIDI Modifiers function or the Merge MIDI in Loop function (see “[Making your settings permanent](#)” on [page 397](#)).

The Inspector – general handling

The MIDI modifiers and effects are set up in the Inspector (although some settings are available in the Mixer as well).

- To show the Inspector, click the “Set up Window Lay-out” button on the toolbar and activate the Inspector option.

The Inspector is displayed to the left of the track list.



- For MIDI tracks, several sections are available in the Inspector. Which of these are displayed is determined in the setup context menu or the Setup dialog of the Inspector. For information about setting up the Inspector, see “[Using the Setup options](#)” on [page 572](#).

- You can fold or unfold the sections individually by clicking on the section name.

Clicking the name for a hidden section brings it to view and hides the other sections. [Ctrl]/[Command]-clicking the tab allows you to hide or show a section without affecting other sections. [Alt]/[Option]-clicking a tab shows or hides all sections in the Inspector.

⇒ Folding or hiding (via the Setup dialog) a section does not affect the functionality but merely hides the section from view. This means your settings will still be active even if you fold or hide the Inspector settings.

The Inspector sections

Basic track settings

The topmost Inspector section contains the basic track settings. These settings either affect the basic functionality for the track (mute, solo, enable record, etc.) or send out additional MIDI data to the connected devices (program change, volume, etc.). The section contains all settings that are available in the track list (see “[The track list](#)” on [page 41](#)), with a few additional parameters:

Parameter	Description
Track name field	Click once to show/hide the topmost Inspector section. Double-click to rename the track.
Edit button	This opens the Channel Settings window for the track (a window showing a channel strip with volume fader and other controls, along with effect settings – see “ Using Channel Settings ” on page 163).
Mute/Solo buttons	Mutes or solos the MIDI track.
Read/Write buttons	Used for automating the track settings – see “ Enabling and disabling the writing of automation data ” on page 240 .
Open Device Panels button	If the MIDI track is routed to a device with a panel, clicking this button opens the respective panel. For more information, see the separate PDF document “MIDI Devices”.
Input transformer button	Opens the Input Transformer dialog, allowing you to transform incoming MIDI events in realtime, see “ The Input Transformer ” on page 440 .
Record enable button	Activate this to make the track ready for recording.

Parameter	Description
Monitor button	When this is activated (and the “MIDI Thru Active” option is activated in the Preferences dialog, MIDI page), incoming MIDI will be routed to the selected MIDI output.
Toggle Time-base button	Switches between musical (tempo related) and linear (time related) time base for the track, see “Switching between musical and linear time base” on page 63 .
Lock button	Activate this to disable all editing of all events on the track.
Lane Display Type button	Allows you to divide the tracks in lanes. For details about lanes, see “Recording audio in Stacked mode” on page 101 .
Volume	Use this to adjust the level for the track. Changing this setting will move the track’s fader in the Mixer window, and vice versa. See “Setting volume in the Mixer” on page 157 for details about setting levels.
Pan	Use this to adjust the panning of the track.
Delay	This adjusts the playback timing of the MIDI track. Positive values delay the playback while negative values cause the track to play earlier. The values are set in milliseconds.
In/Out/Chn pop-up menus	This is where you select MIDI input, MIDI output, and MIDI channel for the track.
Edit Instrument button	If the MIDI track is routed to a VST instrument, clicking this button opens the control panel for the VST instrument.
Bank and Patch Selector pop-up menu	Allows you to select a sound, see below. (If no bank is available, only the Patch selector is shown.)
Apply Track Preset button	Allows you to apply a track preset, see “Applying track presets” on page 358 .

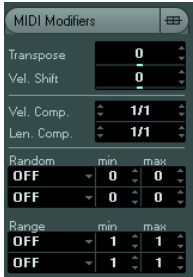
⇒ Note that the functionality of the Bank and Patch selector settings (used for selecting sounds in the connected MIDI instrument) depends on the instrument to which the MIDI output is routed, and how you have set it up in the MIDI Device Manager. The MIDI Device Manager allows you to specify which MIDI instruments and other devices are connected to the various MIDI outputs, thus making it possible to select patches by name. See the chapter [“Using MIDI devices”](#) on [page 380](#) for details about the MIDI Device Manager.

⇒ Many of the basic track settings are duplicated in “mixer channel strip form” in the MIDI Fader section of the Inspector (see below).

VST Expression section (Nuendo Expansion Kit only)

This section is used when working with the VST Expression features, see the chapter “VST Expression” in the Nuendo Expansion Kit manual.

MIDI Modifiers



The settings on this tab affect the MIDI events on the track in realtime during playback. They will also be in effect if you play “live” with the track selected and record enabled (provided that “MIDI Thru Active” is activated in the Preferences dialog, MIDI page). This makes it possible, for example, to transpose or adjust the velocity of your live playing.

⇒ If you want to compare the result of your modifier settings with the “unprocessed” MIDI, you can use the Bypass button in the MIDI Modifiers section. When this is activated, the MIDI Modifiers settings will be temporarily disabled. A bypassed section is indicated by a yellow Bypass button.



Transpose

This allows you to transpose all notes on the track in semitones. The available range is -127 to +127 semitones, but remember that the total range of MIDI note numbers is 0 to 127. Furthermore, not all instruments can play back notes over the whole range. Therefore, extreme transpositions can give rather strange and unwanted results.

- You can also transpose individual MIDI parts using the Transpose field in the info line.

The transposition in the info line (for the individual part) is added to the transpose value you have set up for the whole track in the Inspector.

⇒ This setting is also affected by the global Transpose settings. For detailed information, see the chapter “[The transpose functions](#)” on [page 129](#).

Velocity Shift

This setting lets you change the dynamics of all notes on the track. The value in this field is added to the velocity of each note message that is sent out (use negative values to lower the velocities). The range is -127 to +127 with 0 representing no change in velocity.

Note that the effect of changing the velocity depends on the sound and instrument.

⇒ You can also adjust the velocity of events in individual MIDI parts using the Velocity field in the info line. The velocity shift in the info line (for the individual part) is added to the velocity shift you have set up for the whole track in the Inspector.

Velocity Compression

This function multiplies the velocity values with the factor you specify. This factor is set using a numerator (left value) and a denominator (right value), resulting in a fractional number (1/2, 3/4, 3/2 etc.). For example, if you set the factor to 3/4, the velocities will be three quarters of their original values. This will also affect the difference in velocity between the notes, thus compressing or expanding the velocity scale. Typically, you would combine this setting with the Velocity Shift parameter.

An example:

Let's say you have three notes with the velocity values 60, 90 and 120, and wish to “even out” the velocity differences somewhat. If you set the Velocity Compression value to 1/2, the notes will play back with the velocities 30, 45 and 60. By adding 60 in the Velocity Shift field, the notes will play back with the velocities 90, 105 and 120, meaning you have compressed the velocity range.

In a similar way, you can use Velocity Compression values greater than 1/1 together with negative values in the Velocity Shift field, to expand the velocity range.

⚠ Remember that the maximum velocity is always 127 no matter how much you try to expand.

Length Compression

This value adjusts the lengths of all notes on the track. As with Velocity Compression, the value is set with a numerator and denominator. For example, the value 2/1 means that all note lengths will be doubled, while 1/4 means all note lengths will be a quarter of the actual lengths.

Random

The Random settings let you introduce random variations to various properties of MIDI notes. Anything from very subtle variations to dramatic changes can be applied. There are two separate “random generators”, set up in the following way:

1. Pull down the Random pop-up menu and select which note property is randomized.

The options are position, pitch, velocity and length.

⇒ Keep in mind that depending on the content of the track, certain parameter changes might not be immediately noticeable or have any effect at all (as would be the case if applying random length to a percussion track playing “one-shot” samples for example). To best audition the random changes, choose a track with clearly defined rhythm and note content (as opposed to a string pad).

2. Set the desired range of random deviation by entering values in the two number fields.

The two values govern the limits of the randomization, so that the values will vary between the left value and the right value (you cannot set the left value higher than the right value). The maximum random range for each property is listed in the table below:

Property	Range
Position	-500 to +500 ticks
Pitch	-120 to +120 semitones
Velocity	-120 to +120
Length	-500 to +500 ticks

⇒ You can make independent settings for the two random generators.

- To deactivate the Random function, pull down the Random pop-up menu(s) and select “OFF”.

Range

The Range function lets you specify a note (pitch) or velocity range and either force all notes to fit within this range, or exclude all notes outside this range from playback. As with the Random function, there are two separate Range settings. Set them up as follows:

1. Pull down the Range pop-up menu and select one of the following four modes:

Mode	Description
Vel. Limit	This function affects all velocity values outside the specified range. Velocity values below the Min setting (the lower limit of the range) are set to the Min value, and velocity values above the Max setting are set to the Max value. Notes with velocity values within the set range are not affected. Use this if you want to force all velocity values to fit within a certain range.
Vel. Filter	Velocity Filter works by excluding all notes with velocity values outside the specified range. Notes with velocity values below the Min setting or above the Max setting will not be played back. Use this to “isolate” notes with certain velocity values.
Note Limit	This function allows you to specify a pitch range, and forces all notes to fit within this range. Notes outside the specified range are transposed up or down in octave steps until they fit within the range. Note: If the range is too “narrow”, so that some notes cannot be fit within the range by octave-transposing, these notes will get a pitch in the middle of the range. For example, if you have a note with a pitch of F3, and the range is C4-E4, that note will be transposed to D4.
Note Filter	Note Filter works by excluding all notes with pitches outside the specified range. Notes lower than the Min setting or higher than the Max setting will not be played back. Use this to “isolate” notes with certain pitches.

2. Use the two fields to the right to set the minimum and maximum values.

These values will be shown as numbers (0–127) for the velocity modes and as note numbers (C-2 to G8) for the pitch modes.

⇒ Note that you can make independent settings for the two Range functions.

- To deactivate the Range function, pull down the Range pop-up menu(s) and select “OFF”.

MIDI Fader section

This contains a single channel strip, allowing you to set volume, pan, mute/solo and other parameters for the track, and a panel view of the active sends/inserts. This is a “mirror” of the track’s channel strip in the Nuendo Mixer – see “MIDI channel strips” on [page 174](#).

Notepad section

This is a standard notepad, allowing you to enter notes and comments about the track. Each track has its own notepad in the Inspector.

Network section

This contains controls related to Nuendo’s Network functions, see “Networking” on [page 482](#).

VST Instrument section

If the MIDI track is routed to a VST instrument, a new subpanel will appear at the bottom of the Inspector, labeled with the name of the VST instrument. Clicking this section shows a duplicate of the Inspector settings for the VST instrument channel. This makes it easy to adjust the channel settings for the VST instrument while you are editing the MIDI track.

- If the VST instrument has multiple outputs (and thus several Mixer channels), there will be a setting called “Output” at the top of the VST Instrument section.

New subpanels will also be added in the following cases:

- When a MIDI track is routed to an external instrument or effect that has an associated MIDI Device. In this case, the new subpanel will get the name of the device.
- When a MIDI track is routed to an effect plug-in that also receives audio data, i.e. that is used as an insert effect for an audio track (e.g. MIDI Gate), a subpanel for this audio track appears in the MIDI track inspector.
- If a MIDI track is routed to a plug-in assigned to a FX Channel track, a corresponding FX subpanel is added to the Inspector.

⇒ For an easy way to combine MIDI and VST instruments, check out instrument tracks (see “VST instruments and instrument tracks” on [page 215](#)).

User Panel section

This allows you to display MIDI device panels, which are control panels for external hardware. This is described in the separate PDF document “MIDI Devices”.

Quick Controls section

This allows you to configure quick controls, e.g. to use remote devices. See the chapter “Track Quick Controls” on [page 362](#) for details.

MIDI effects

Nuendo comes with a number of MIDI effect plug-ins, capable of transforming the MIDI output from a track in various ways.

Just like the MIDI modifiers, MIDI effects are applied in realtime to the MIDI data played back from the track (or to MIDI you play live “thru” the track).

What are MIDI effects?

Although a MIDI effect can be similar to an audio effect, it is important to remember that you're not processing the sound resulting from MIDI playback, but the MIDI data (the “instructions” for how the music is played back).

A MIDI effect will change properties of the MIDI events (e.g. change the pitch of notes) and/or generate new MIDI events (for example, a MIDI delay may add new MIDI notes, “echoing” the original notes).

⇒ The included MIDI effect plug-ins are described in the separate PDF document “Plug-in Reference”.

Insert and send effects

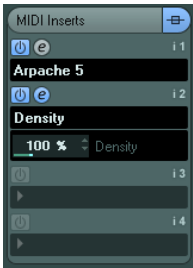
As with audio effects, there are two ways to route the MIDI events on a track to an effect:

⇒ If you add an insert effect, the MIDI events will be sent to the effect, which will process the data and pass it on to the track’s MIDI output (or to another insert effect). In other words, the MIDI events will be routed “through” the insert effect.

⇒ If you use a send effect, the MIDI events will be sent both to the track’s MIDI output and to the effect. That is, you will get both the unprocessed MIDI events and the output of the MIDI effect. Note that the effect can send its processed MIDI data to any MIDI output – not necessarily to the one used by the track.

There are separate sections in the Inspector for MIDI inserts and MIDI sends.

MIDI Inserts section

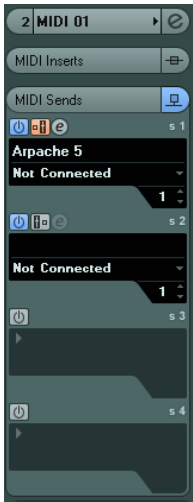


This allows you to add up to four MIDI insert effects. The section contains the following items:

Item	Description
Bypass button	Click this to temporarily disable all insert effects for the track (useful for comparing with the unprocessed MIDI, etc.).
Inserts section tab	The symbol on the right of the tab has a blue background when an insert effect is activated.
Effect selection pop-up menu (x 4)	Selecting an effect from this pop-up menu automatically activates it and brings up its control panel (which can be a separate window or a number of settings below the insert slot in the Inspector). To remove an insert effect completely, select “No Effect”.
On button (x 4)	Allows you to turn the selected effect on or off.
Edit button (x4)	Click this to bring up the control panel for the selected effect. Depending on the effect, this may appear in a separate window or below the insert slot in the Inspector. Clicking the button again hides the control panel.

⇒ Effects that display their controls in the Inspector can be opened in a separate control panel window by pressing [Alt]/[Option] and clicking the Edit button.

MIDI Sends section



This allows you to add up to four MIDI send effects. Unlike audio send effects, you can select and activate send effects individually for each track. The section contains the following items:

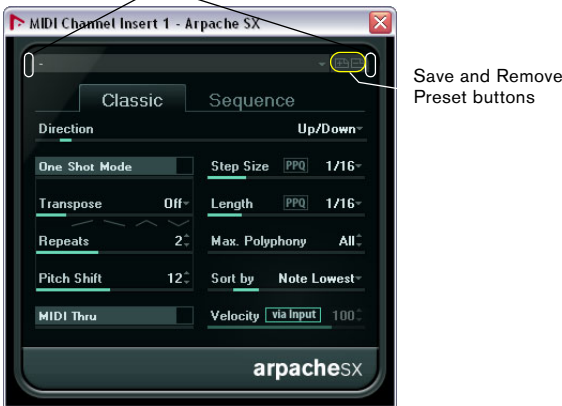
Item	Description
Bypass button	Click this to temporarily disable all send effects for the track (useful for comparing with the unprocessed MIDI, etc.).
Sends section tab	The symbol on the right of the tab has a blue background when a send effect is activated.
Effect selection pop-up menu (x 4)	Selecting an effect from this pop-up menu automatically activates it and brings up its control panel (which can be a separate window or a number of settings below the send slot in the Inspector). To remove a send effect completely, select "No Effect".
On button (x 4)	Allows you to turn the selected effect on or off.
Pre/Post button (x4)	If this is activated, the MIDI signals will be sent to the send effects before the MIDI modifiers and insert effects.
Edit button (x4)	Click this to bring up the control panel for the selected effect. Depending on the effect, this may appear in a separate window or below the sends slot in the Inspector. Clicking the button again hides the control panel.
Output pop-up menu (x4)	This determines to which MIDI output the effect will send the processed MIDI events.
Channel setting (x4)	This determines on which MIDI channel the effect will send the processed MIDI events.

⇒ Effects that display their controls in the Inspector can be opened in a separate control panel window by pressing [Alt]/[Option] and clicking the Edit button.

About presets

Several of the MIDI plug-ins come with a number of presets for instant use.

MIDI In and Out activity indicators



- To load a preset, select it from the Presets pop-up menu.
- To store your current settings as a preset, click on the "+" button ("Save Preset...") to the right of the Presets menu.

You will be asked to specify a name for the preset. The saved preset will then be available for selection from the pop-up menu for all instances of that MIDI plug-in, in all projects.
- To remove a preset, select it and click on the "-" button ("Remove Preset").

At the left and right borders of the Presets pop-up menu you will also find MIDI In and Out activity indicators. Whenever the plug-in receives or transmits MIDI data, the left or the right indicator will light up, respectively.

Applying a MIDI insert effect – an example

Here is a step-by-step example of how to add a MIDI insert effect to a MIDI track:

1. Select the MIDI track and open the Inspector.
2. Open the MIDI Inserts tab in the Inspector.
 - Alternatively you can use the Mixer: bring up the extended Mixer panel and select “Inserts” on the view options pop-up menu for the track’s channel strip.
3. Click in one of the insert slots to open the MIDI effect pop-up menu.
4. Select the desired MIDI effect from the pop-up menu. The effect is automatically activated (the power button for the insert slot lights up) and its control panel appears, either in a separate window or in the MIDI Inserts section below the slot (depending on the effect).

Now all MIDI from the track will be routed through the effect.

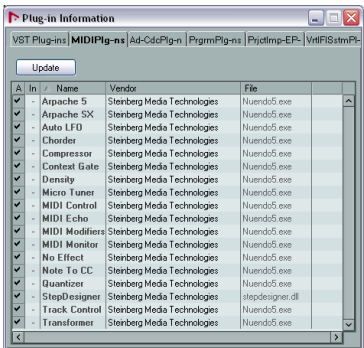
5. Use the control panel to make settings for the effect. All included MIDI effects are described in the separate PDF document “Plug-in Reference”.

- You can bypass the insert effect by clicking its power button (above the insert slot).
- To bypass all insert effects for the MIDI track, use the bypass button in the MIDI Inserts section in the Inspector, in the Mixer channel strip or in the track list.
- To remove an insert effect, click in its slot and select “No Effect”.

Managing plug-ins

Selecting Plug-in Information from the Devices menu opens a window in which all loaded plug-ins, audio and MIDI, are listed.

- To view the MIDI effect plug-ins, click the MIDI Plug-ins tab.



- The leftmost column allows you to deactivate plug-ins. This is useful if you have plug-ins installed that you do not want to use in Nuendo. Only plug-ins that are activated (ticked checkbox) will appear on the MIDI effect pop-up menus. Note that plug-ins that are currently in use cannot be deactivated.
- The second column shows how many instances of each plug-in are currently used in the project.
- The remaining columns show various information about each plug-in and cannot be edited.

Background

The MIDI Device Manager allows you to specify and set up your MIDI devices, making global control and patch selection easy.

But the MIDI Device Manager also features powerful editing functions that can be used to create MIDI device panels. MIDI device panels are internal representations of external MIDI hardware, complete with graphics. The MIDI device panel editor provides all the tools you need to create device maps where every parameter of an external device (and even an internal device like a VST instrument) can be controlled and automated from inside Nuendo.

For descriptions of how to create device maps and the powerful device panel editing features, see [“About Device panels”](#) on [page 386](#). For additional information on how to create panels for VST instruments, see the separate PDF document “MIDI Devices”.

MIDI devices – general settings and patch handling

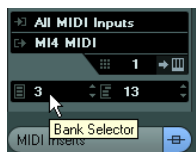
On the following pages, we will describe how to install and set up preset MIDI devices, and how to select patches by name from within Nuendo. For a description on how to create a MIDI device from scratch, please refer to the separate PDF document “MIDI Devices”.

About Program Change and Bank Select

To instruct a MIDI instrument to select a certain patch (sound), you send a MIDI Program Change message to the instrument. Program Change messages can be recorded or entered in a MIDI part like other events, but you can also enter a value in the Program Selector field in the Inspector for a MIDI track. This way, you can quickly set each MIDI track to play a different sound.

With Program Change messages, you are able to select between 128 different patches in your MIDI device. However, many MIDI instruments contain a larger number of patch locations. To make these available from within Nuendo, you need to use Bank Select messages, a system in which the programs in a MIDI instrument are divided into

banks, each bank containing 128 programs. If your instruments support MIDI Bank Select, you can use the Bank Selector field in the Inspector to select a bank, and then the Program Selector field to select a program in this bank.

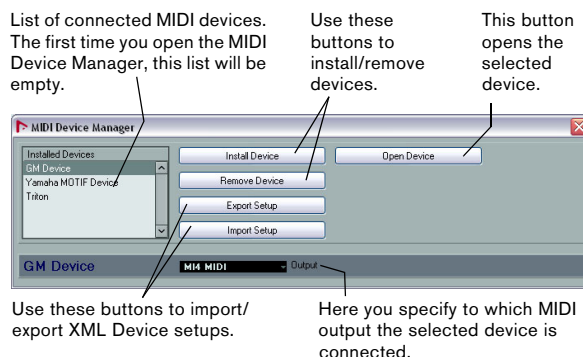


Unfortunately, different instrument manufacturers use different schemes for how Bank Select messages are constructed, which can lead to some confusion and make it hard to select the correct sound. Also, selecting patches by numbers this way seems unnecessarily cumbersome, when most instruments use names for their patches nowadays.

To help with this, you can use the MIDI Device Manager to specify which MIDI instruments you have connected by selecting from a vast list of existing devices or by specifying the details yourself. Once you have specified which MIDI devices you are using, you can select to which particular device each MIDI track is routed. It is then possible to select patches by name in the track list or Inspector.

Opening the MIDI Device Manager

Select MIDI Device Manager from the Devices menu to bring up the following window:



When you open the MIDI Device Manager for the first time, it will be empty (because you have not installed any devices yet). On the following pages we describe how to add a pre-configured MIDI device to the list, how to edit the settings and how to define a device from scratch.

⇒ Note that there is an important difference between installing a preset MIDI device (“Install Device”) and importing a MIDI device setup (“Import Setup”):

- The presets do not include any device mapping of parameters and controls and no graphic panels. They are simply patch name scripts. When you install a preset MIDI device, it is added to the Installed Devices list. For more information about patch name scripts, see the separate PDF document “MIDI Devices”.

- A device setup can include device mapping, panels and/or patch information. Device setups are also added to the list of installed devices when imported. For more information about setups and device panels, see “About Device panels” on [page 386](#).

Defining a new MIDI device

If your MIDI device is not included in the list of pre-configured devices (and is not a “plain” GM or XG device), you need to define it manually to make it possible to select patches by name.

1. In the MIDI Device Manager, click the Install Device button.

The Add MIDI Device dialog opens.

2. Select “Define New...” and click OK.

The “Create New MIDI Device” dialog opens. For a description of the options in this dialog, see the separate PDF document “MIDI Devices”.

3. In the Identical Channels list, activate the MIDI channels you would like the device to use.

This means that the device will receive Program Change over any MIDI channel. For a description of Identical and Individual Channels, see the separate PDF document “MIDI Devices”.

4. Enter a name for the device at the top of the dialog, and click OK.

The device appears in the Installed Devices list, and the device node structure for the device is automatically shown in a new window.

5. Select Patch Banks from the pop-up menu at the top of the window.

As you can see, the list is currently empty.

6. Make sure that the Enable Edit checkbox is activated. Now you can use the functions on the Commands pop-up menu on the left to organize the patch structure of the new device.

Installing a preset MIDI device

To install a preset MIDI device, proceed as follows:

1. Click the Install Device button.

A dialog opens listing all pre-configured MIDI devices. For now we assume that your MIDI device is included in this list.

2. Locate and select the device in the list and click OK.

- If your MIDI device is not included in the list but is compatible with the GM (General MIDI) or XG standards, you can select the generic GM or XG Device options at the top of the list.

When you select one of these options, a name dialog will appear. Enter a name for the instrument and click OK.

The device now appears in the Installed Devices list to the left.

3. Make sure that the new device is selected in the list and open the Output pop-up menu.

4. Select the MIDI output that the device is connected to.

5. Click the Open Device button.

A separate window opens for the selected device, showing a node structure in the left half of the window. At the top of this structure is the device itself, and below it the MIDI channels used by the device. For more information about the Device window, see the separate PDF document “MIDI Devices”.

6. Select Patch Banks from the pop-up menu at the top of the window.



The Patch Banks list in the left half of the window shows the patch structure of the device. This could simply be a list of patches, but it is usually one or several layers of banks or groups containing the patches (much like a folder structure on a hard disk for example).

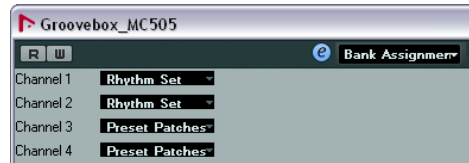


- You can rename a device in the Installed Devices list by double-clicking and typing – this is useful if you have several devices of the same model, and want to separate them by name instead of by number.
 - To remove a device from the Installed Devices list, select it and click Remove Device.
- ⇒ Note that if there already exists a panel for the device, opening the device might open this panel first. In this case, click on the Edit (“e”) button to open the Device window.

About Patch Banks

Depending on the selected device, you may find that the Patch Banks list is divided in two or more main banks. Typically, these are called Patches, Performances, Drums, etc. The reason for having several patch banks is that different “types” of patches are handled differently in the instruments. For example, while “patches” typically are “regular” programs that you play one at the time, “performances” may be combinations of programs, which could be split across the keyboard, layered, or used for multi-timbral playback, and so on.

For devices with several banks, you will find an additional item labeled “Bank Assignment” in the pop-up menu at the top of the window. Selecting this opens a window in which you can specify for each MIDI channel which bank it should use.



The selection here will affect which bank is displayed when you select programs by name for the device in the track list or Inspector. For example, many instruments use MIDI channel 10 as an exclusive drum channel, in which case you would want to select the “Drums” (or “Rhythm Set”, “Percussion”, etc.) bank for channel 10 in this list. This would then let you choose between different drum kits in the track list or Inspector.

Limitations

There is no easy way to import a patch name script into an existing MIDI device. For a complex workaround based on XML editing, see the separate PDF document “MIDI Devices”.

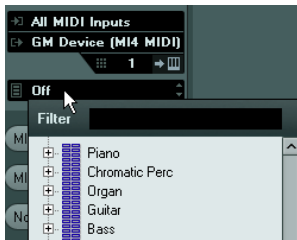
Selecting a patch for an installed device

If you return to the Project window at this point, you will find that the installed device has been added to the MIDI Output menus (in the track list and the Inspector). Now you can select patches by name, in the following way:

1. Pull down the Output menu (in the track list or Inspector) for the track you want to associate the installed device with, and select the device.

This directs the track to the MIDI output specified for the device in the MIDI Device Manager. The Bank and Program Selector fields in the track list and Inspector are replaced by a single Program Selector field that currently reads "Off".

2. Click the Program Selector field to display a pop-up menu, hierarchically listing all the patches in the device. The list is similar to the one displayed in the MIDI Device Manager. You can scroll the list up and down (if required), click the plus/minus signs to show or hide subgroups, etc.



You can also use a filter function here. For this, enter the search term in the Filter field, e.g. "drum", and press [Return] to display all sounds with "drum" in the name.

3. Click a patch in the list to select it.

This sends the appropriate MIDI message to the device. You can also scroll the program selection up or down, as with any value.

Renaming patches in a device

The pre-configured devices list is based on the factory-preset patches, i.e. the patches included in the device when you first bought it. If you have replaced some of the factory presets with your own patches, you need to modify the device so that the patch name list matches the actual device:

1. In the MIDI Device Manager, select the device in the Installed Devices list.
2. Click Open Device.
Make sure that Patch Banks is selected on the pop-up menu at the top of the window.
3. Activate the Enable Edit checkbox.
When this is turned off (default), you cannot edit the pre-configured devices.
4. Use the Patch Banks display to locate and select the patch you want to rename.
In many instruments, the user-editable patches are located in a separate group or bank.
5. Click on the selected patch in the Patch Banks list to edit its name.
6. Type in the new name and click OK.
7. Rename the desired patches in this way, and finish by deactivating Enable Edit again (to avoid modifying the device by accident).

⇒ You can also make more radical changes to the patch structure in a device (adding or deleting patches, groups or banks), see below. For example, this is useful if you expand your MIDI device by adding extra storage media such as RAM cards.

Patch Structure

Patches are structured as follows:

- Banks are the main categories of sounds – typically patches, performances and drums, as described above.
- Each bank can contain any number of groups, represented by folders in the list.
- The individual patches, performances or drum kits are represented by presets in the list.

The Commands pop-up menu contains the following items:

Create Bank

Creates a new bank at the highest hierarchical level of the Patch Banks list. You can rename this by clicking on it and typing a new name.


New Folder

Creates a new subfolder in the selected bank or folder. This could correspond to a group of patches in the MIDI device, or just be a way for you to categorize sounds, etc. When you select this item, a name dialog opens, allowing you to name the folder. You can also rename the folder afterwards by clicking it and typing in the list.

New Preset


This adds a new preset in the selected bank or folder. You can rename the preset by clicking it and typing a new name.

When the preset is selected, the corresponding MIDI events (Program Change, Bank Select, etc.) are shown in the event display to the right. The default setting for a new preset is Program Change 0 – to change this, proceed as follows:

-  For details on which MIDI events are used for selecting patches in the MIDI device, consult its documentation.
- To change which Program Change value is sent out to select the patch, adjust the number in the Value column for the Program Change event.
 - To add another MIDI event (e.g. Bank Select) click directly below the last event in the list and select a new event from the pop-up menu.
 - To replace an event, click on it and select another event from the pop-up menu.

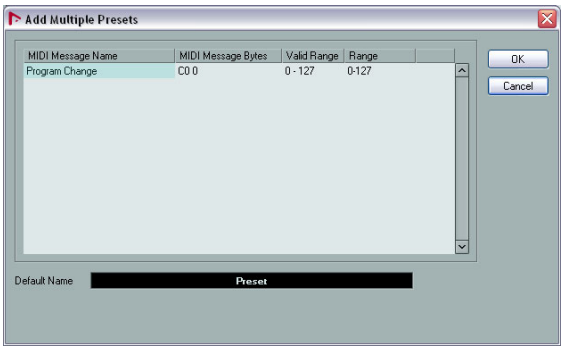
After adding a new event, you need to set its value in the Value column, as with Program Change.

For example, a MIDI device may require that a Bank Select message is sent first, followed by a Program Change message, in which case you would need to replace the default Program Change message with a Bank Select message and add a new Program Change after that.

- To remove an event, select it and press [Delete] or [Backspace].
-  Different devices use different schemes for Bank Select. When you insert a Bank Select event, you should check the device's documentation to find out whether to choose "CC: BankSelect MSB", "Bank Select 14 Bit", "Bank Select 14 Bit MSB-LSB Swapped" or some other option.

Add Multiple Presets

This opens a dialog, allowing you to set up a range of pre-sets to be added to the selected bank or folder.



Proceed as follows:

1. Add the event types required for selecting a patch in the MIDI device.
This is done just as when editing the settings for a single event: clicking in the event display brings up a pop-up menu from which you can select an event type.
2. Use the Range column to set up either a fixed value or a range of values for each event type in the list.
This requires some explanation:
If you specify a single value in the Range column (e.g. 3, 15 or 127), all added presets will have an event of this type set to the same value.
If you instead specify a value range (a start value and an end value, separated by a dash, e.g. 0–63), the first added preset will have an event set to the start value, the next value will be incrementally raised by one and so on, up to and including the end value.

MIDI Message Name	MIDI Message Bytes	Valid Range	Range
Program Change	C0 0	0 - 127	0-2
CC: Gen Purp 4	B0 13 0	0 - 127	7

⇒ The number of added presets depends on the Range setting.

3. Specify a Default Name below the event display.

The added events will get this name, followed by a number. You can rename presets manually in the Patch Banks list later.

4. Click OK.

A number of new presets have now been added to the selected bank or folder, according to your settings.

Other editing functions

- You can move presets between banks and folders by dragging them to the Patch Banks list.
- You can remove a bank, folder or preset by selecting it in the Patch Banks list and pressing [Backspace].
- If you specify more than one bank, a Bank Assignment item is added to the pop-up menu at the top of the window. Use this to assign banks to the different MIDI channels (see [“About Patch Banks”](#) on [page 383](#)).

About Device panels

On the following pages we will describe how to use MIDI Device panels and the powerful MIDI device panel editing features of the MIDI Device Manager.

⇒ We recommend that you first configure the patch banks, then export the device setup before editing the panels. This way, most of your settings will be saved in case of panel configuration problems.

The panels are saved in XML format. For more information, see the separate PDF document “MIDI Devices”.

Basic concept

The panel editing features in the MIDI Device Manager can be seen as a separate application or entity within Nuendo. It allows you to build device maps complete with control panels, including all parameters controllable from within Nuendo. Building more complex device maps requires that you are familiar with SysEx programming (see the separate PDF document “MIDI Devices”). But you can also create simpler panels by assigning MIDI Control Change messages to control objects, which does not require any programming skills.

Although these powerful editing features are there if you need them, you do not have to use them to use MIDI devices.

Device panels in the program

In this section we will take a look at a pre-configured MIDI device panel to illustrate how it can be used in Nuendo. Several device maps can be found in the Knowledge Base on the Steinberg web site (<http://knowledgebase.steinberg.net>).

Opening a device setup

Proceed as follows to open a MIDI device setup:

1. Open the MIDI Device Manager from the Devices menu.

2. Click the “Import Setup” button.

A file dialog opens.

3. Select a device setup file for import by navigating to the Device Maps folder (see above).

The Device setup files are saved in XML format, for more information see the separate PDF document “MIDI Devices”.

4. Click Open. The Import MIDI Devices dialog opens where you can select one or several devices for import. A device setup file can contain one or several MIDI devices.



5. Select a device and click OK.

The device is added to the list of installed devices in the MIDI Device Manager.

6. Select the correct MIDI output from the Output pop-up menu, select the device in the list and click the Open Device button.

The device control panel opens in a separate window. The Edit (“e”) button at the top opens the Edit Panel window, see the separate PDF document “MIDI Devices”.



7. Close the Device panel and return to the Project window.
 8. Select the device from the “Output Routing” pop-up menu for a MIDI track.
- Note that for some devices, you may have to set the MIDI channel to “Any”.

Now the Device panel can be opened by clicking the Open Device Panels button in the Inspector or in the channel strip for the corresponding track in the Mixer.

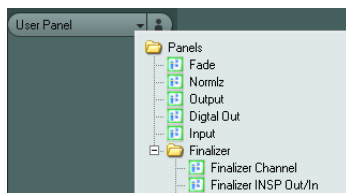


- ⇒ Note that [Ctrl]/[Command]-clicking the Open Device Panels button allows you to open a subpanel via the panel browser pop-up menu.

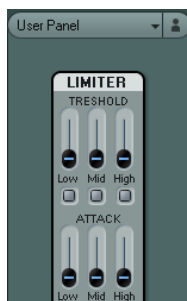
Showing panels in the Inspector

1. In the Inspector, open the User Panel tab and click on the arrow on the right.

A “Panels” folder is shown with the selected device in a node structure below it. If you open all the folders, you can select any individual panel from the device that “fits” into the User Panel space.



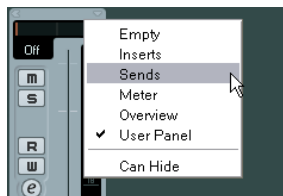
2. Select a panel by double-clicking it in the list.
- The panel opens in the Inspector.



- ⇒ If you cannot see any panels in the “Panels” folder, although you have successfully set up a MIDI device with several panels, make sure that you selected the correct channel from the Channel pop-up menu, preferably “Any” to see all device panels. Also make sure that the panels fit into the space, otherwise they will not be available in the “Panels” folder.

Showing panels in the Mixer

1. Open the Mixer and make sure that the extended channel view is shown.
2. Open the View options pop-up menu for the MIDI channel connected to the device and select “User Panel”.



3. Click the arrow next to the label “user” at the top of the extended section of the channel strip.

The Panels folder is displayed like in the Inspector, but with different available panels. Just like in the Inspector, the panel has to “fit” into the available space to be selectable.

4. Double-click to select a panel.

The panel is now shown in the extended section of the channel strip.



Automating device parameters

Automation works just like for normal audio and MIDI tracks:

1. Open the device control panel by clicking the Open Device Panels button in the Inspector.

2. Activate Write automation on the device panel.

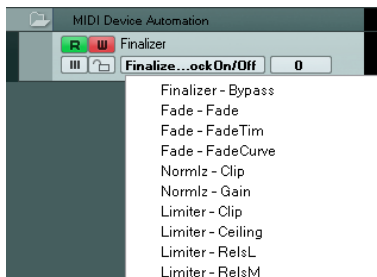
You can automate the device by either moving knobs and sliders on the control panel or by drawing curves on the automation track for a selected parameter.



3. If you now go back to the Project window, there will be a MIDI Device Automation track in the track list.

If the track is hidden, select “Show Used Automation” on the Track Folding submenu of the Project menu.

If you click in the name field, all parameters in the device are shown and can be selected for automation.



- To open another automation track for the next parameter on the pop-up menu, click the + button (“Append automation track”) at the bottom left of the automation track.

⇒ If you wrote automation but your MIDI device is not yet connected, the panel will not display any parameter changes when playing back the track with the Read button activated.

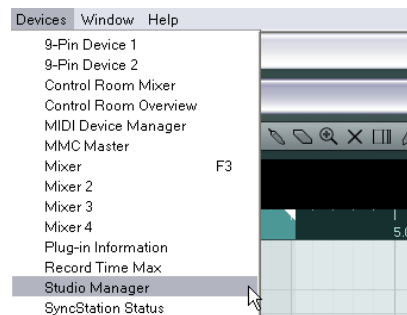
About Studio Connections

Studio Connections is the name of an initiative led by Steinberg and Yamaha. The initiative intends to create industry standards for totally integrated system environments using software and hardware products.

First implementation stage of the Studio Connections open standard is the integration and support of Yamaha's Studio Manager 2 (SM2) and Total Recall for compatible hardware devices.

For further information about Studio Connections, please visit the website <http://www.studioconnections.org>.

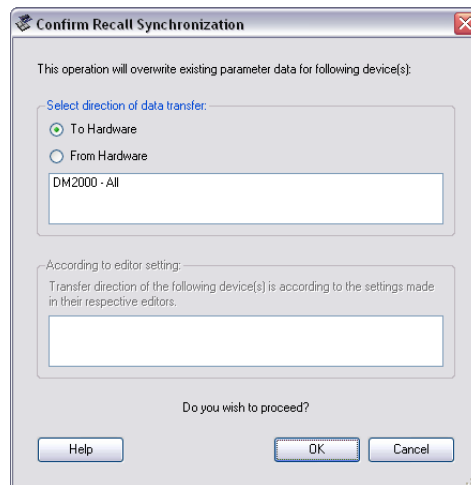
If you have an SM2 component installed, there is an additional menu item on the Devices menu.



Total Recall

Total Recall means that you can save and recall all settings of your hardware and software products by opening one integrated file in a DAW such as Nuendo or Cubase. Also you will have instant and organized access to hardware editors.

When you load a project or switch to another active project that contains SM2 data, the Total Recall Synchronization dialog opens:



This dialog can also be opened any time from the Studio Manager's Synchronize menu. Click OK for the Dump to start.

Virtual MIDI Devices

If you have a new OPT component (e.g. the DM2000) which uses a new special interface, you can access these components as virtual MIDI Devices in the MIDI track's output routing (if the output of the OPT is configured).

When a MIDI track is routed to such a device, the "Open Device Panels" button becomes available.

- Click the Open Device Panels button, to open the editor window for the device.



⇒ Please also refer to the separate documentation for the Studio Manager 2 and the OPT components.

Introduction

This chapter describes the various MIDI processing functions available on the MIDI menu. They offer various ways to edit MIDI notes and other events, either in the Project window or from within a MIDI editor.

MIDI functions vs. MIDI modifiers

In some cases, the result of a MIDI function can also be obtained by using MIDI modifiers and effects (see [“MIDI realtime parameters and effects”](#) on [page 372](#)). For example, the operations “Transpose” and “Quantize” are available both as MIDI modifiers and as MIDI functions.

The main difference is that MIDI modifiers and effects do not affect the actual MIDI events on the track in any way, while MIDI functions change the events “permanently” (although recent changes can be undone).

Use the following guidelines to decide which path to choose for operations that are available both as modifiers or effects and as functions:

- If you want to adjust a few parts or events only, use MIDI functions. The MIDI modifiers and effects affect the output of the whole track (although they can be made permanent in a specific area with the Merge MIDI in Loop function).
- If you want to experiment with different settings, use MIDI modifiers and effects.
- MIDI modifiers and effects settings are not reflected in the MIDI editors, since the actual MIDI events are not affected. This can be potentially confusing; if you have transposed notes using modifiers for example, the MIDI editors will still show the notes with their original pitch (but they will play back at their transposed pitch). Therefore, MIDI functions are a better solution if you want to see the effects of your editing in the MIDI editors.

What is affected by the MIDI functions?

Which events are affected when you use a MIDI function depends on the function, the active window and the current selection:

- Some MIDI functions only apply to MIDI events of a certain type.
- For example, quantization only affects notes, while the Delete Controllers function only applies to MIDI controller events.

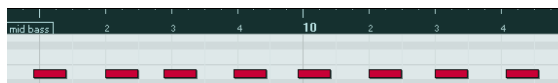
- In the Project window, the MIDI functions apply to all selected parts, affecting all events (of the relevant types) in them.
- In the MIDI editors, the MIDI functions apply to all selected events. If no events are selected, all events in the edited part(s) will be affected.

The quantizing functions

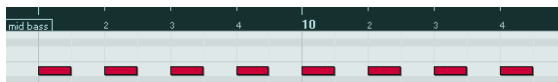
What is quantizing?

Quantizing in its fundamental form is a function that automatically moves recorded notes, positioning them on exact note values:

For example, if you record a series of eighth notes, some of them may end up slightly beside the exact eighth note positions.



Quantizing the notes with the quantize grid set to eighth notes will move the “misplaced” notes to exact positions.

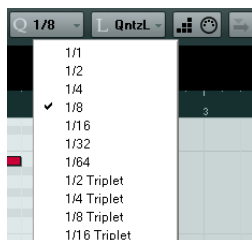


However, quantizing is not only a method of correcting errors, it can also be used creatively in various ways. For example, the “quantize grid” does not have to consist of perfectly straight notes, some notes can automatically be excluded from quantizing, etc.

⇒ When quantizing MIDI, only MIDI notes are affected (no other event types). However, you can choose to move the controllers together with their respective notes by activating the “Move Controller” option in the Quantize Setup dialog, see [“The Move Controller setting”](#) on [page 394](#).

Setting up quantize on the toolbar

At its most basic, setting up quantizing consists of selecting a note value from the Quantize pop-up menu on the toolbar (in the Project window or a MIDI editor).



This allows you to quantize to exact note values (straight, triplet or dotted notes) only.

Setting up quantize in the Quantize Setup dialog

If you want more options than those available on the pop-up menu, select “Quantize Setup...” from the MIDI menu (or “Setup...” from the Quantize pop-up menu) to open the Quantize Setup dialog.

⇒ Any settings you make in the dialog are immediately reflected in the Quantize pop-up menus. However, if you want your settings permanently available on the Quantize pop-up menus, you have to use the presets functions (see “Presets” on [page 394](#)).

The grid display in the middle of the dialog shows one bar (four beats), with blue lines indicating the quantize grid (the positions that notes will be moved to). Value changes in the grid, presets and quantize options will be graphically reflected here, see below.

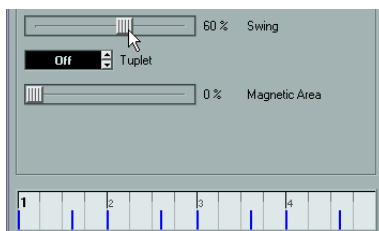
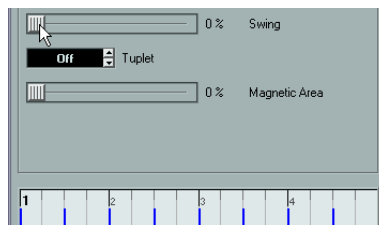
The Quantize Setup dialog contains the following settings:

The Grid and Type pop-ups

These are used to determine the basic note value for the quantizing grid. In other words, these have the same functionality as the Quantize pop-up menu on the toolbar.

Swing

The Swing slider is only available when a straight note value is selected for the grid and Tuplet is off (see below). It lets you offset every second position in the grid, creating a swing or shuffle feel. When you adjust the Swing slider, the result is shown in the grid display.



A straight eighth note grid compared with a grid with 60% swing.

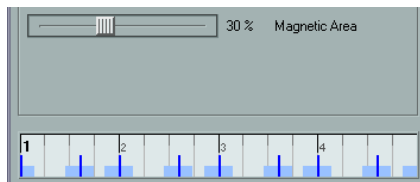
Tuplet

Allows you to create more rhythmically complex grids by dividing the grid into smaller steps.

Magnetic Area

This allows you to specify that only notes within a certain distance from the grid lines are affected by quantizing.

- When the slider is set to 0%, the Magnetic Area function is deactivated, i.e. all notes are affected by quantizing. If you move the slider gradually to the right, you will note how the magnetic areas are shown around the blue lines in the grid display.



Only notes within the indicated zones will be affected by quantizing.

Presets

The controls in the lower left corner of the dialog allow you to store the current settings as a preset, which will then be available on the Quantize menus on the toolbars. The usual preset procedures apply:

- To store the settings as a preset, click the Store button.
- To load a stored preset into the dialog, simply select it from the pop-up menu.
- This is useful if you want to modify an existing preset.
- To rename the selected preset, double-click on the name and type in a new one.
- To remove a stored preset, select it from the pop-up menu and click Remove.
- You can also create presets by extracting existing grooves from a MIDI part.

Just select the desired MIDI part and drag it on the grid display in the middle of the Quantize Setup dialog or open the Advanced submenu of the MIDI menu and select “Part to Groove” (see [“Part to Groove”](#) on [page 396](#)).

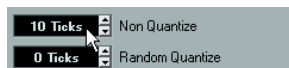
Apply and Auto

These functions allow you to apply quantizing directly from the dialog, see below.

- ⚠ If you do not want to apply the quantizing you have set up in the dialog, close the window by clicking its close button.

The Non Quantize setting

This setting affects the result of the quantizing. It allows you to set a “distance” in ticks (120ths of sixteenth notes).



Events that already are within the specified distance from the quantize grid will not be quantized. This allows you to keep slight variations when you quantize, but still correct notes that are too far from the grid.

The Random Quantize setting

This setting affects the result of the quantizing. It allows you to set a “distance” in ticks (120ths of sixteenth notes).

Events will be quantized to random positions within the specified “distance” from the quantize grid, thus creating a more “loose” quantizing. Much like the Non Quantize setting, this allows for slight variations, while at the same time keeping notes from ending up too far from the grid.

The Iterative Strength setting

Here you specify how much the notes are moved towards the grid when using the Iterative Quantize function, see below.



The Move Controller setting

When this is activated, controllers related to notes (pitch-bend, etc.) are automatically moved with the notes when these are quantized.

Applying quantize

There are several ways to apply the quantize:

- The standard method is to select “Over Quantize” from the MIDI menu (or using a key command, by default [Q]). This quantizes the selected MIDI parts or notes according to the current Quantize pop-up menu setting.
- You can also apply quantizing directly from the Quantize Setup dialog, by clicking the “Apply Quantize” button.

- If you activate the “Auto” checkbox in the Quantize Setup dialog, any change you make in the dialog is immediately applied to the selected MIDI parts or notes.

A great way of using this feature is to set up a playback loop, and adjust the settings in the dialog until you get the desired result.

- ⚠ When you apply quantize, the result is based on the original position of the notes. Therefore, you can freely try out different quantize settings with no risk of “destroying” anything (see also [“Undo Quantize”](#) on [page 395](#)).

The Auto Quantize function

If you activate the Auto Q button on the Transport panel, all MIDI recordings you make are automatically quantized according to the settings you have made in the Quantize Setup dialog.

Iterative Quantize


Another way to apply “loose” quantization is to use the Iterative Quantize function on the MIDI menu. It works like this:

Instead of moving a note to the closest quantize grid position, Iterative Quantize moves it only part of the way. You specify how much the notes are moved towards the grid with the “Iterative Strength” setting in the Quantize Setup dialog.

Iterative Quantize also differs from “regular” quantization in that the operation is not based on the notes’ original positions but on their current, quantized position. This makes it possible to repeatedly use Iterative Quantize, gradually moving the notes closer to the quantize grid until you have found the desired timing.

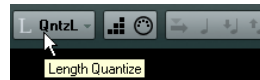
Advanced Quantize functions

Quantize Lengths

 This function is only available from within the MIDI editors.

This function (on the Advanced Quantize submenu of the MIDI menu) will quantize the length of the notes, without changing their start positions. At its most basic level, this function will set the length of the notes to the Length Quantize value on the MIDI editor toolbar. However, if you have selected the “Quantize Link” option on the Length Quantize pop-up menu, the function will resize the note according to the quantize grid, taking the Swing, Tuplet and Magnetic Area settings into account.

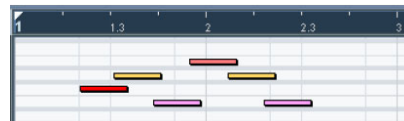
An example:



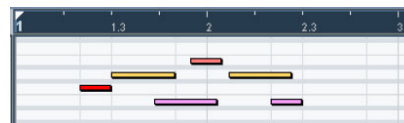
Length Quantize set to “Quantize Link”.



Some 16th notes.



Here, the quantize value has been set to straight 16th notes with Swing at 100%.



Selecting Quantize Lengths will adjust the note lengths according to the grid. If you compare the result to the first figure above, you will find that notes that started within the odd sixteenth note “zones” show the longer grid length, and notes in the even zones have the shorter length.

Quantize Ends

The Quantize Ends function on the Advanced Quantize submenu will only affect the end positions of notes. Apart from that, it works just like regular quantizing, taking the Quantize pop-up menu setting into account.

Undo Quantize

As mentioned above, the original position of each quantized note is stored. Therefore, you can make the selected MIDI notes revert to their original, unquantized state at any time by selecting Undo Quantize from the Advanced Quantize submenu. This is independent from the regular Undo History.

Freeze Quantize

There may be situations when you want to make the quantized positions “permanent”. For example, you may want to quantize notes a second time, having the results based on the current quantized positions rather than the original positions. To make this possible, select the notes in question and select “Freeze Quantize” from the Advanced Quantize submenu. This makes the quantized positions permanent.

⚠ After you have performed a Freeze Quantize for a note, you cannot undo its quantization.

Part to Groove

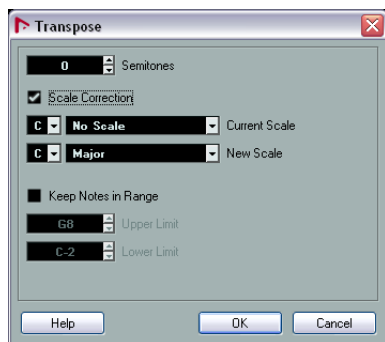
With this function, you can extract the groove from a selected MIDI part and turn it into a Quantize preset.

You can also extract grooves from audio, using hitpoints (see [“Creating groove quantize maps”](#) on [page 301](#)), or audio parts, ReCycle (.rex) parts or drum parts that have been processed with the Detect Silence function. Since audio contains no velocity information, velocity will remain unchanged after applying a Groove that you extracted from audio.

In both cases, the resulting groove appears on the Quantize menus and you apply it as any Quantize preset. You can also view and edit the resulting quantize settings in the Quantize Setup dialog.

Transpose

The Transpose item on the MIDI menu opens a dialog with settings for transposing the selected notes.



⇒ You can also use the transpose track for transposing, see [“The transpose functions”](#) on [page 129](#).

Semitones

This is where you set the amount of transposition.

Scale Correction

Scale Correction transposes the selected notes by forcing them to the closest note of the selected scale type. This can be used for creating interesting key and tonal changes, either by itself or in conjunction with the other settings in the Transpose dialog.

- To activate Scale Correction, click the checkbox.
- Select a root note and scale type for the current scale from the upper pop-up menus.
- Select a root note and scale type for the new scale from the lower pop-up menus.

Make sure to select the correct root note if you want to keep the result in the same key as the original notes, or select an entirely different key if you want to experiment.

Keep Notes in Range

When this is activated, transposed notes will remain within the Upper and Lower Limit values.

- If a note ends up outside the limits after transposition, it will be shifted to another octave, keeping the correct transposed pitch if possible.

If this is not possible (if you have set a very narrow range between the Upper and Lower Limit), the note will be transposed “as far as possible”, i.e. to the Upper or Lower Limit note. If you set the Upper and Lower Limits to the same value, all notes will be transposed to this pitch!

OK and Cancel

Clicking OK performs the transposition. Clicking Cancel closes the dialog without transposing.

Making your settings permanent

The settings described in the chapter “[MIDI realtime parameters and effects](#)” on [page 372](#) do not change the MIDI events themselves, but work like a “filter”, affecting the music on playback. Therefore, you may want to make them permanent, i.e. convert them to “real” MIDI events, for example to transpose a track and then edit the transposed notes in a MIDI editor. For this, you can use two commands from the MIDI menu:

- “Freeze MIDI Modifiers” – This applies all filter settings permanently to the respective track.
With this function, the settings are “added” to the events on the track, and all modifiers will be set to zero.
- “Merge MIDI in Loop” – This merges all selected tracks (or parts) to create a new track.
The settings are applied during the merge and will still be displayed later in the respective menus.

These two functions are described in the following sections.

Freeze MIDI Modifiers

The “Freeze MIDI Modifiers” function affects the following settings for MIDI tracks:

- Several settings on the main tab of the Inspector (program and bank selection and the Delay parameter).
- The settings on the MIDI Modifiers tab (i.e. Transpose, Velocity Shift, Velocity Compression and Length Compression).
- The settings on the MIDI Inserts tab (if, e.g., you are using an arpeggiator and want to convert the added notes to real events).

The following settings for MIDI parts are taken into account as well:

- The Transpose and Velocity settings for parts displayed on the info line – the Volume setting is not taken into account.

To use the “Freeze MIDI Modifiers” function, proceed as follows:

1. Select the desired MIDI track.
2. Pull down the MIDI menu and select “Freeze MIDI Modifiers”.
The Inspector settings will be converted to MIDI events and inserted at the beginning of the part(s). All notes of the part(s) will be modified accordingly and the Inspector settings will be reset.

Merge MIDI in Loop

The “Merge MIDI in Loop” function combines all MIDI events on all unmuted tracks, applies MIDI modifiers and effects and generates a new MIDI part, containing all the events as you would hear them play back. Proceed as follows:

1. Make sure only the desired MIDI track(s) are unmuted.
If you only want to include events from a single track in the merge operation, you may want to solo the track.
2. Set up the left and right locators to encompass the area you want to merge.
Only events starting within this area will be included.
3. Select the track on which you want the new part to be created.
This can be a new track or an existing track. Data in the cycle area on the track can be kept or overwritten (see below).
4. Select “Merge MIDI in Loop” from the MIDI menu.
A dialog opens with the following options:

Option	Description
Include Inserts	If this is activated, any MIDI insert effects currently activated for the track(s) will be applied.
Include Sends	If this is activated, any MIDI send effects currently activated for the track(s) will be applied.
Erase Destination	If this is activated, all MIDI data between the left and right locators on the destination track will be deleted.
Include Chase	If this is activated, events placed outside the selected part but relating to it will be included in the processing, e.g. a Program Change right before the left locator. For details about chase events, see “ About Chase ” on page 88 .

5. Click OK.
A new part is created between the locators on the destination track, containing the processed MIDI events.

Applying effects to a single part

Normally, the MIDI modifiers and effects affect a whole MIDI track. This may not always be what you want – you may want to apply some MIDI effects to a single part for example (without having to create a separate track for that part only). The Merge MIDI in Loop function can help:

1. Set up your MIDI modifiers and MIDI effects the way you want them for the part.
This will of course affect the whole track, but focus on the part for now.
2. Set the locators to encompass the part.
Simply select the part and choose Locators to Selection from the Transport menu (or use the corresponding key command, by default [P]).
3. Make sure that the track holding the part is selected in the track list.
4. Select Merge MIDI in Loop.
5. In the dialog that opens, activate the desired effect options, make sure that Erase Destination is activated and click OK.
Now a new part is created on the same track, containing the processed events. The original part is deleted.
6. Turn off or reset all MIDI modifiers and effects, so that the track plays back as usual.

Dissolve Part

The Dissolve Part function on the MIDI menu allows you to separate MIDI events according to channels or pitches:

- When you work with MIDI parts (on MIDI channel “Any”) containing events on different MIDI channels, activate the “Separate Channels” option.
- To separate MIDI events according to pitch, activate the “Separate Pitches” option.

Typical examples are drum and percussion tracks, where different pitches usually correspond to separate drum sounds.

⇒ When dissolving a part into either separate channels or separate pitches, you can automatically remove the silent (empty) areas of the resulting parts by activating the “Optimized Display” checkbox in the Dissolve Part dialog. This option is not available when “Dissolve to Sublanes” is activated, see [“Dissolving to sublanes”](#) on [page 399](#).

Dissolving parts into separate channels

Setting a track to MIDI channel “Any” will cause each MIDI event to play back on its original MIDI channel, rather than a channel set for the whole track. There are two main situations when “Any” channel tracks are useful:

- When you record several MIDI channels at the same time.

You may for example have a MIDI keyboard with several keyboard zones, where each zone sends MIDI on a separate channel. Recording on an “Any” channel track allows you to play back the recording with different sounds for each zone (since the different MIDI notes play back on separate MIDI channels).

- When you have imported a MIDI file of Type 0.

MIDI files of Type 0 contain only one track, with notes on up to 16 different MIDI channels. If you were to set this track to a specific MIDI channel, all notes in the MIDI file would be played back with the same sound; setting the track to “Any” will cause the imported file to play back as intended.

The Dissolve Part function scans MIDI parts for events on different MIDI channels and distributes the events into new parts on new tracks, one for each MIDI channel found. This allows you to work with each musical part individually.

Proceed as follows:

1. Select the parts containing MIDI data on different channels.
2. Select “Dissolve Part” from the MIDI menu.
3. In the dialog that opens, select the “Separate Channels” option.

Now, for each MIDI channel used in the selected parts, a new MIDI track is created and set to the corresponding MIDI channel. Each event is then copied into the part on the track with the corresponding MIDI channel. Finally, the original parts are muted.

An example:



This part contains events on MIDI channels 1, 2, and 3.



Selecting “Dissolve Part” creates new parts on new tracks, set to channels 1, 2, and 3. Each new part contains only the events on the respective MIDI channel. The original MIDI part is muted.

Dissolving parts into separate pitches

The Dissolve Part function can also scan MIDI parts for events of different pitches, and distribute the events into new parts on new tracks, one for each pitch. This is useful when the different pitches are not used in a melodic context, but rather for separating different sounds (e.g. MIDI drum tracks or sampler sound FX tracks). By dissolving such parts, you can work with each sound individually, on a separate track.

Proceed as follows:

1. Select the parts containing MIDI data.
2. Select “Dissolve Part” from the MIDI menu.
3. In the dialog that opens, select the “Separate Pitches” option.

A new MIDI track is created for each used pitch in the selected parts. The events are then copied into the parts on the track for the corresponding pitch. Finally, the original parts are muted.

Dissolving to sublanes

In the lower right section of the Dissolve Part dialog, you will find the “Dissolve to Sublanes” option. When this is activated, the part will not be dissolved onto different tracks but onto different sublanes of the original track, allowing for a better management of MIDI material that “belongs together”.

This is useful when working with drums for example, as it allows you to split up a part into different drum sounds and edit these independently. When you have made the desired modifications, you can reassemble all your drums into one part using the Bounce MIDI command, see below.

This option is especially handy when working with instrument parts on instrument tracks. “Normal” dissolving would lead to a number of different tracks each routed to a separate instance of the connected VST instrument. When dissolving parts to sublanes, the parts will still reside on the same track, with all parts using the same VST instrument instance.

Bounce MIDI

With this function, you can combine MIDI parts on several lanes to a single MIDI part. This can be used to reassemble a drum part that you dissolved onto several lanes for editing, see above. Simply select the MIDI parts on the different lanes that you want to combine and select “Bounce MIDI” on the MIDI menu.

During the bounce process, any muted parts will be removed. If transpose and velocity values were specified for the parts, these are taken into account as well.

Repeat Loop

With this function, the events inside the independent track loops will be repeated until the end of the part, i.e. the notes that were previously only played repeatedly are now actual notes on the MIDI track. Events to the right of the independent track loop (within the same part) will be replaced by this function. For more information about independent track loops, see [“The independent track loop” on page 409](#).

Other MIDI functions

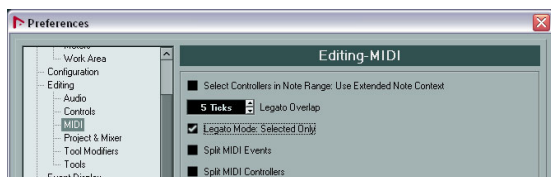
The following items can be found on the Functions sub-menu of the MIDI menu:

Legato

Extends each selected note so that it reaches the next note.



You can specify a gap or overlap for this function with the “Legato Overlap” setting in the Preferences dialog (Editing-MIDI page).



When using Legato with this setting, each note will be extended to end 5 ticks before the next note.

When you activate “Legato Mode: Selected Only”, the length of the note will be adjusted so that it reaches the next selected note, allowing you, for example, to only apply Legato to your bass line (when playing on a keyboard).

Fixed Lengths

⚠ This function is only available from within the MIDI editors.

This function resizes all selected notes to the length set with the Length Quantize pop-up menu on the MIDI editor toolbar.

Delete Doubles

This function removes double notes, i.e. notes of the same pitch on the exact same position from the selected MIDI parts. Double notes can occur when recording in Cycle mode, after Quantizing, etc.

Delete Controllers

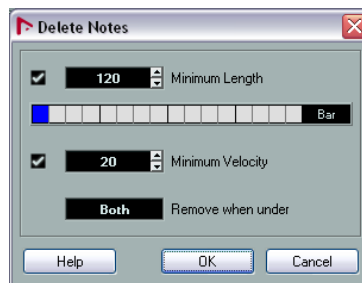
This function removes all MIDI controllers from the selected MIDI parts.

Delete Continuous Controllers

This function removes all “continuous” MIDI controller events from the selected MIDI parts. Therefore, “on/off” events such as sustain pedal events are not removed.

Delete Notes

Allows you to delete very short or weak notes. This is useful for automatically removing unwanted “ghost notes” after recording. Selecting “Delete Notes...” opens a dialog in which you set up the criteria for the function.



The parameters have the following functionality:

Minimum Length

When the Minimum Length checkbox is activated, the note length is taken into account, allowing you to remove short notes. You can either specify the minimum length (for notes to be kept) in the value field or by dragging the blue line in the graphical length display below.

- The graphical length display can correspond to 1/4 bar, one bar, two bars or four bars.

You change this setting by clicking in the field to the right of the display.



In this case, the whole length display corresponds to two bars, and the Minimum Length is set to 32nd notes (60 ticks).

Minimum Velocity

When the Minimum Velocity checkbox is activated, the velocity of notes is taken into account, allowing you to remove weak notes. You specify the minimum velocity (for notes to be kept) in the value display.

Remove when under

This setting is only available when both Minimum Length and Minimum Velocity is activated. By clicking in this field, you select whether both the length and the velocity criteria must be met for notes to be deleted, or whether one of the criteria will suffice.

OK and Cancel

Clicking OK performs the automatic delete according to the rules set up. Clicking Cancel closes the dialog without deleting notes.

Restrict Polyphony

Selecting this item opens a dialog in which you can specify how many “voices” are used (for the selected notes or parts). Restricting the polyphony this way is useful when you have an instrument with limited polyphony and want to make sure all notes will be played. The effect is achieved by shortening notes as required, so that they end before the next note starts.

Pedals to Note Length

This function scans for Sustain pedal on/off events, lengthens the affected notes to match the Sustain pedal off position, and then removes the Sustain Controller on/off events.

Delete Overlaps (mono)

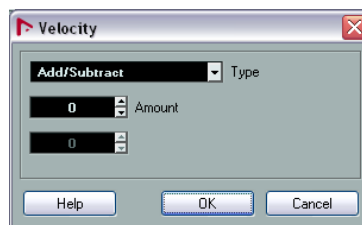
This function allows you to make sure that no notes of the same pitch overlap (i.e. that one starts before the other ends). Overlapping notes of the same pitch can confuse some MIDI instruments (a new Note On is transmitted before the Note Off is transmitted). This command can then be used to automatically solve the problem.

Delete Overlaps (poly)

This function shortens notes when required, so that no note begins before another ends. This happens regardless of which pitch the notes have.

Velocity

This function opens a dialog that allows you to manipulate the velocity of notes in various ways.



The following types of velocity processing are available:

Add/Subtract

This simply adds a fixed number to the existing velocity values. You set the value (positive or negative) with the Amount parameter.

Compress/Expand

Compresses or expands the “dynamic range” of MIDI notes by scaling the velocity values according to the Ratio setting (0–300%). The principle behind this is that multiplying different velocity values with a factor higher than 1 (over 100%) will also make the differences between velocity values greater, while using a factor lower than 1 (under 100%) will make the differences smaller. In short:

- To compress (“even out” velocity differences), use ratio values below 100%.

After compression, you would probably want to add a velocity amount (with the Add/Subtract function) to maintain the average velocity level.

- To expand (create greater difference in velocity), use ratio values above 100%.

Before you expand, you may want to adjust the velocity with the Add/Subtract function, so that the average velocity is somewhere in the middle of the range. If the average velocity is high (near 127) or low (near 0), expansion will not work properly, simply because velocity values can only be between 0 and 127!

Limit

This function allows you to make sure that no velocity values fall outside a given range (the Lower and Upper values). Any velocity values outside this range are raised/lowered to exactly the Lower/Upper values.

Fixed Velocity

This function sets the velocity of all selected notes to the Insert Velocity value on the toolbar in the MIDI editors.

Thin Out Data

Thins out MIDI data. Use this to ease the load on your external MIDI devices if you have recorded very dense controller curves, etc.

You can also manually thin out the controller data by using the quantize function in the Key Editor.

Extract MIDI Automation

This is an extremely useful function as it allows you to quickly and easily convert the continuous controllers of your recorded MIDI parts into MIDI track automation data, making them available for editing in the Project window. Proceed as follows:

1. Select the desired MIDI part containing the continuous controller data.
2. Select “Extract MIDI Automation”. (This command is also available on the Key Editor context menu.)
The controller data will automatically be removed from the controller lane in the editor.
3. In the Project window, open the automation track(s) for the respective MIDI track. You will find that an automation track has been created for each of the continuous controllers in the part.

This function can only be used for continuous controllers. Data such as Aftertouch, Pitchbend, or SysEx cannot be converted to MIDI track automation data.

⇒ Remember that to be able to hear the automation data, you have to activate the Read button for the respective automation track(s).

⇒ MIDI controller automation is also affected by the Automation Merge Mode, see “[MIDI controller automation](#)” on [page 261](#).

Reverse

This function inverts the order of the selected events (or of all events in the selected parts), causing the MIDI music to play backwards. Note that the effect is different from reversing an audio recording. With MIDI, the individual notes will still play as usual in the MIDI instrument – it is only the order of playback that is changed.

Merge Tempo from Tapping

This function allows you to create a complete tempo track based on your tapping, see the section “[Merge Tempo From Tapping](#)” on [page 459](#).

Introduction

There are several ways to edit MIDI in Nuendo. You can use the tools and functions in the Project window for large-scale editing, or the functions on the MIDI menu to process MIDI parts in various ways (see [“What is affected by the MIDI functions?”](#) on [page 392](#)). For hands-on graphical editing of the contents of MIDI parts, you use the MIDI editors:

- The Key Editor is the default MIDI editor, presenting notes graphically in an intuitive piano roll-style grid. The Key Editor also allows for detailed editing of non-note events such as MIDI controllers. For more information, see [“The Key Editor – Overview”](#) on [page 406](#).
- The Score Editor (Nuendo Expansion Kit only) shows MIDI notes as a musical score and comes with advanced tools and functions for notation, layout and printing.
- The Drum Editor (Nuendo Expansion Kit only) is similar to the Key Editor, but takes advantage of the fact that with drum parts, each key corresponds to a separate drum sound.
- The List Editor shows all events in the selected MIDI parts as a list, allowing you to view and edit their properties numerically. It also allows you to edit SysEx messages. For more information, see [“The List Editor – Overview”](#) on [page 424](#) and [“Working with SysEx messages”](#) on [page 427](#).
- The Edit In-Place function allows you to edit MIDI parts directly in the Project window. This is similar to working in the Key Editor, but makes it easier to edit MIDI in context with other track types, see [“The In-Place Editor”](#) on [page 422](#).
- You can also edit MIDI in the Project Browser. Like the List Editor, the Project browser shows the events in a list and allows you to perform numerical editing. However, you will probably find the List Editor better suited for MIDI editing, since it has various dedicated features and functions for this. The Project Browser is described in the chapter [“The Project Browser”](#) on [page 464](#).

⇒ You can define each of the editors mentioned above as your default MIDI editor, see below.

Please note that features that are identical in these editors will be described in the Key Editor section. The sections about the In-Place Editor (see [“The In-Place Editor”](#) on [page 422](#)) and the List Editor (see [“The List Editor – Overview”](#) on [page 424](#)) describe the specific features of these editors only.

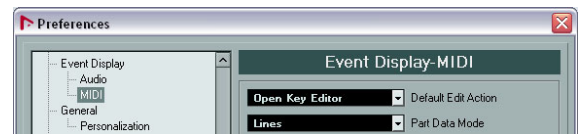
Opening a MIDI editor

There are two ways to open a MIDI editor:

- Select one or several parts (or a MIDI track, with no parts selected), pull down the MIDI menu and select Open Key Editor, Open Score Editor (Nuendo Expansion Kit only), Open Drum Editor (Nuendo Expansion Kit only), Open List Editor or Open In-Place Editor (or use the corresponding key command).

The selected parts (or all parts on the track, if no part was selected) will open in the chosen editor.

- Double-click a part to open it in the default editor. Which editor opens depends on the Default Edit Action setting in the Preferences dialog (Event Display–MIDI page).



Nuendo Expansion Kit only: If the “Edit as Drums when Drum Map is assigned” option is activated and a drum map is selected for the edited track, the Drum Editor will open. This way you can double-click to open the Key Editor (or the Score Editor, List or In-Place Editor, depending on your preferences) but drum tracks will automatically open in the Drum Editor.

⇒ If the part you open for editing is a shared copy, any editing you perform will affect all shared copies of this part. Shared copies are created by pressing [Alt]/[Option]-[Shift] and dragging, or by using the Repeat function with the “Shared copies” option activated. In the Project window, shared copies are indicated by the part name in italics and an icon in the bottom right corner of the part.

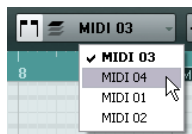
Handling several parts

When you open a MIDI editor with several parts (or a MIDI track containing several parts) selected, you might find it somewhat hard to get an overview of the different parts when editing.

For such cases the editor toolbar features a few functions to make working with multiple parts easier and more comprehensive:

- The Part List menu lists all parts that were selected when you opened the editor (or all parts on the track if no parts were selected), and lets you select which part is active for editing.

When you select a part from the list, it is automatically made active and centered in the note display.



⇒ Note that it is also possible to activate a part by selecting an event within this part with the Arrow tool.

- The button “Edit Active Part Only” lets you restrict editing operations to the active part only.

For example, if you select “All” from the Select submenu of the Edit menu with this option activated, only events in the active part will be selected. Similarly, if you select notes by dragging with the Arrow tool (making a selection rectangle), only the notes in the active part will be selected.



“Edit Active Part Only” is activated on the toolbar.

- You can zoom in on the active part so that it fills the screen by selecting “Zoom to Event” from the Zoom submenu of the Edit menu.

- The button “Show Part Borders” can be used if you want to see clearly defined borders for the active part. When this is activated, all parts except the active one are grayed out, making the borders easily discernible. In the Key Editor, there are also two “markers” in the ruler with the name of the active part, marking its beginning and end. These can be moved freely to change the size of the part.

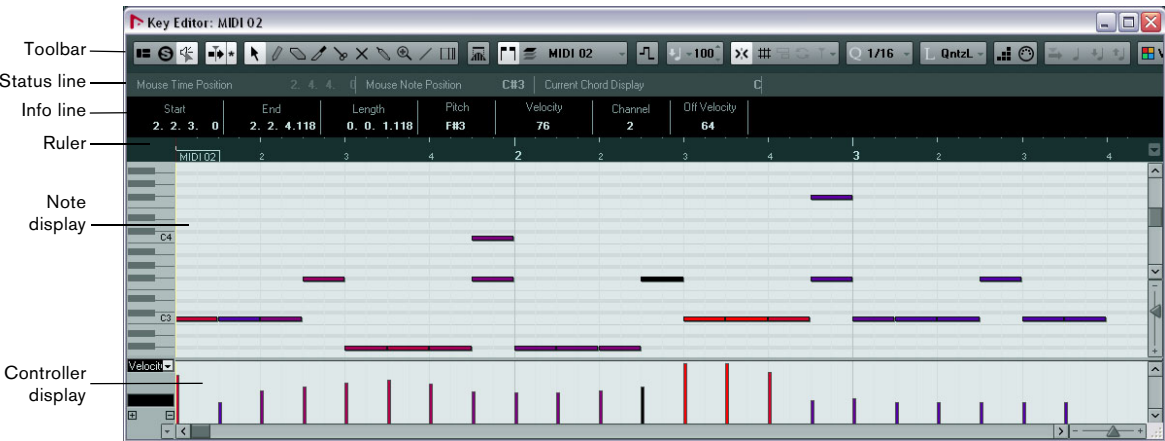


“Show Part Borders” is activated on the toolbar.

- It is possible to cycle between parts (making them active) using key commands.

In the Key Commands dialog – Edit category, you will find two functions for this: “Activate Next Part” and “Activate Previous Part”. If you assign key commands to these, you can use them to cycle between parts in the editors. For further information, see [“Setting up key commands”](#) on [page 581](#).

The Key Editor – Overview



The toolbar

The toolbar contains tools and various settings for the Key Editor. The following toolbar elements are available:

Option	Description
Set up Window Layout	Clicking this allows you to show/hide the status line and info line for the editor. This button is always available on the toolbar.
Solo Editor	This is described in the section “The Solo Editor button” on page 409 . This control is always available on the toolbar.
Acoustic Feed-back	This is described in the section “Acoustic Feedback” on page 410 . This control is always available on the toolbar.
Auto-Scroll	This button activates/deactivates Auto-Scroll for the Key Editor, see “Auto-Scroll” on page 409 .
Tool buttons	These are the tools used for editing in the Key Editor.
Independent Track Loop	This button activates/deactivates the independent track loop, see “The independent track loop” on page 409 .
Auto Select Controllers	Use this button to also select all available controller data for a note when selecting the note in the editor.
Part List	The Part List allows you to switch between several selected parts when working in the Key Editor, see “Handling several parts” on page 405 .
Indicate Transpositions	When this is activated, MIDI notes are displayed according to their transposition settings, see “Indicate Transpositions” on page 133 .
Insert Velocity	Use this field to specify a velocity value for any notes that are entered in the editor.
Nudge Palette	The Nudge buttons allow you to move or trim elements in the editor, see “Moving and transposing notes” on page 413 .

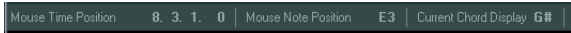
Option	Description
Transpose Palette	The transpose buttons allow you to transpose the selected notes, see “Moving and transposing notes” on page 413 .
Snap/Quantize	The Snap controls are described in the section “The Snap function” on page 48 and the quantize functions in the chapter “MIDI processing and quantizing” on page 391 .
Step/MIDI Input	These controls are described in the sections “Editing notes via MIDI” on page 416 and “Step input” on page 416 .
Event Colors	The Color options are described in the section “Coloring notes and events” on page 410 .
Edit VST Instrument	This button opens the VST Instrument panel (if the track is routed to a VST instrument).

⇒ You can show/hide most of the toolbar elements (except for the “Set up Window Layout”, Solo Editor, and Acoustic Feedback buttons, which are always visible) by activating/deactivating the corresponding options on the context menu.

⇒ You can specify which toolbar items are shown and store/recall different toolbar configurations, see [“Using the Setup options”](#) on [page 572](#).

The status line

The status line is displayed below the toolbar in the Key Editor.



It displays the following information:

Option	Description
Mouse Time Position	This displays the exact time position of the mouse pointer, in the format selected for the ruler, allowing you to perform editing or to insert notes at exact positions.
Mouse Note Position	This displays the exact pitch of the mouse pointer position, making it easier to find the right pitch when entering or transposing notes.
Current Chord Display	When the project cursor is positioned over notes making up a chord, this chord is displayed here.

- To show or hide the status line, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Status Line option.

The info line

Name	Start	End	Length	Offset
MIDI 02	1. 1. 1. 0	4. 1. 1. 0	3. 0. 0. 0	0. 0. 0. 0

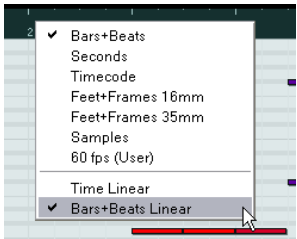
The info line shows information about the selected MIDI note. If several notes are selected, the values for the first note are displayed (in color). You can edit all values on the info line using regular value editing (see “Editing on the info line” on [page 415](#) for details). Length and position values are displayed in the format currently selected for the ruler (see below).

- To show or hide the info line, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Info Line option.

The ruler

The ruler shows the timeline, by default in the display format selected on the Transport panel. You can select a separate format for a MIDI editor ruler on the Ruler pop-up menu, opened by clicking the arrow button to the right of it. For a list of the available formats, see “The ruler” on [page 47](#).

At the bottom of the pop-up menu, there are two additional items:



- If “Time Linear” is selected, the ruler, note display, and controller display will be linear in relation to time.

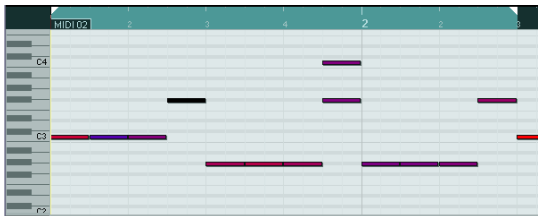
This means that if the ruler shows bars and beats, the distance between the bar lines will vary depending on the tempo.

- If “Bars+Beats Linear” is selected, the ruler, note display, and controller display will be linear in relation to tempo.

This means that if the ruler shows bars and beats, the distance between beats will be constant.

In most cases, you would set the display format to “Bars+Beats” and “Bars+Beats Linear” mode when editing MIDI.

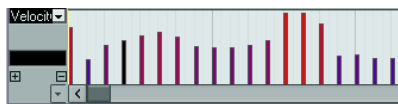
The note display



The note display is the main area in the Key Editor. It contains a grid in which MIDI notes are shown as boxes. The width of a box corresponds to the note length, and the vertical position of a box corresponds to the note number (pitch), with higher notes higher up in the grid. The piano keyboard to the left serves as a guide for finding the right note number.

For a description of how to display colors in the note display, see “Coloring notes and events” on [page 410](#).

The controller display

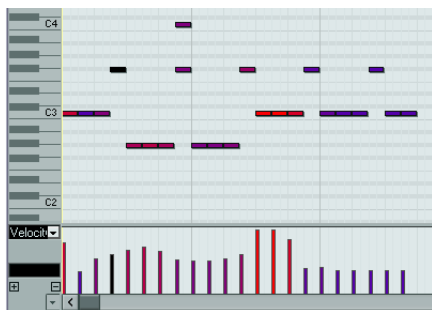


The area at the bottom of the Key Editor window is the controller display. This consists of one or several controller lanes, each showing one of the following properties or event types:

- Velocity values of the notes
- Pitchbend events
- Aftertouch events
- Poly Pressure events
- Program Change events
- SysEx events
- Articulations (see the chapter “VST Expression” in the Nuendo Expansion Kit manual).
- Any type of continuous controller event (see [“Editing continuous controllers on the controller lane”](#) on page 421)

To change the size of the controller display, drag the divider between the controller display and the note display. This will make the controller display larger and the note display smaller, or vice versa.

Velocity values are shown as vertical bars in the controller display, with higher bars corresponding to higher velocity values.



Each velocity bar corresponds to a note in the note display.

Events other than velocity values are shown as blocks, the heights of which correspond to the values of the events. The beginning of an event is marked by a curve point. To select an event, click on the curve point, so that it turns red.

⇒ Unlike notes, events in the controller display have no length. The value of an event in the display is “valid” until the start of the next event.

For a description of editing in the controller display, see [“Editing in the controller display”](#) on page 417.

Key Editor operations

Zooming

Zooming in the Key Editor is done according to the standard zoom procedures, using the zoom sliders, the Zoom tool or the Zoom submenu of the Edit menu.

- When you drag a rectangle with the Zoom tool, the result depends on the “Zoom Tool Standard Mode: Horizontal Zooming Only” option in the Preferences dialog (Editing–Tools page).

If this is activated, the window will only be zoomed horizontally; if not, the window will be zoomed both horizontally and vertically.

Using the Trim tool

The Trim tool allows you to change the length of note events by cutting off the end or the beginning of notes. It is available in the Key Editor and in the List Editor.

Using the Trim tool means moving the note-on or the note-off event for one or several notes to a position defined with the mouse. Proceed as follows:

1. Select the Trim tool on the toolbar.

The mouse pointer changes to a knife symbol.



2. Locate the notes that you wish to edit.

3. To edit a single note, click on it with the Trim tool. The range between the mouse pointer and the end of the note will be removed.

You can use the mouse note info on the status line to find the exact position for the trim operation.

4. To edit several notes, click and drag with the mouse across the notes.

A line is displayed. The notes will be trimmed along this line.



Trimming the end of three note events.

- By default, the Trim tool will cut off the end of notes. To trim the beginning of the note(s), press [Alt]/[Option] while dragging.
- If you press [Ctrl]/[Command] while dragging, you will get a vertical trim line, allowing you to set the same start or end time for all edited notes.

You can change the Trim tool key commands in the Preferences dialog (Editing–Tool Modifiers page).

⇒ Note that when you trim the beginning of a note in the List Editor, the note may move to a different position in the list (since other events may now begin before the edited event).

⇒ Note that the trimmed note ends or starts do not snap to the grid.

Playing back

You can play back your music as usual when working in a MIDI editor. There are several features designed to make editing easier during playback.

The Solo Editor button



If you activate the Solo Editor button, only the edited MIDI parts will be heard during regular playback.

Auto-Scroll



As described in the section “Auto-Scroll” on [page 50](#), the Auto-Scroll function makes the window “follow” the project cursor during playback, so that the current play position is

visible at all times. However, when you are working in a MIDI editor, you may want to deactivate Auto-Scroll – this way, the events you are working with will stay visible.

The Auto-Scroll buttons in each MIDI editor are independent of the Project window Auto-Scroll setting, which means that Auto-Scroll can be activated in the Project window and deactivated in the MIDI editor you are working in.

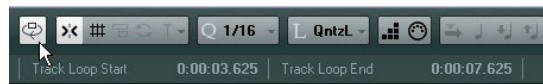
The independent track loop

The independent track loop is a sort of “mini-cycle”, affecting only the MIDI part being edited. When the loop is activated, the MIDI events within the loop will be repeated continuously and completely independent – other events (on other tracks) will be played back as usual. The only “interaction” between the loop and the “regular playback” is that every time the cycle starts over again, so does the loop.

To set up the independent track loop, proceed as follows:

1. Activate the loop by clicking on the Loop button on the toolbar.

If it is not visible, right-click the toolbar and add the Independent Track Loop Settings section – see “[Using the Setup options](#)” on [page 572](#).



When the loop is activated, the cycle is not shown in the ruler.

2. Now you need to specify the length of the loop. You have the following possibilities:

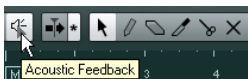
- [Ctrl]/[Command]-click and [Alt]/[Option]-click in the ruler to set the start and end of the loop, respectively.
- Click and drag in the upper part of the ruler to move the locators to the desired positions.

The independent track loop is indicated in purple in the ruler. When the corresponding options are activated on the context menu, the track loop start and end are also displayed in the Status line.

⇒ The MIDI events will be looped as long as the Loop button is activated and the MIDI editor window is open.

To turn the loop into actual MIDI notes, use the Repeat Loop function on the MIDI menu, see “[Repeat Loop](#)” on [page 399](#).

Acoustic Feedback



If the speaker icon on the toolbar is activated, individual notes will automatically be played back (auditioned) when you move or transpose them, or when you create new notes by drawing. This makes it easier to hear what you're doing.

In the Preferences dialog (MIDI page), you can specify whether the Acoustic Feedback function takes into account any MIDI sends or inserts used for the track. Activate the "Audition through MIDI Inserts/Sends" option if you want the layering of MIDI instruments (by MIDI sends) to be active within the MIDI editors as well. This way, the acoustic feedback of the editors sends the MIDI data not only to the output selected for the track, but additionally through any MIDI inserts and MIDI sends assigned to it. Note, however, that this also means that the MIDI events will be sent through any MIDI plug-ins assigned to this track.

Snap



The Snap function helps you find exact positions when editing in a MIDI editor. It does this by restricting horizontal movement and positioning to certain positions. Operations affected by snap include moving, duplicating, drawing, sizing, etc.

- How Snap works depends on the Snap Type pop-up menu next to the Snap button.

See ["The Snap function"](#) on [page 48](#).

- When the "Bars+Beats" display format is selected in the ruler, the snap grid is set by the Quantize value on the toolbar.

This makes it possible to snap not only to straight note values but also to swing grids set up in the Quantize Setup dialog (see ["The quantizing functions"](#) on [page 392](#)).

When any of the other display formats is selected in the ruler, positioning is restricted to the displayed grid, i.e. you can snap in finer increments by zooming in, and in coarser increments by zooming out the display.

Coloring notes and events

By using the Event Colors pop-up menu on the toolbar, you can select a color scheme for the events in the editor. The following options are available:

Option	Description
Velocity	The notes get different colors depending on their velocity values.
Pitch	The notes get different colors depending on their pitch.
Channel	The notes get different colors depending on their MIDI channel value.
Part	The notes get the same color as their respective part in the Project window. Use this option when you are working with two or more tracks in an editor, to make it easier to see which notes belong to which track.
GridMatch	The notes get different colors depending on their time position. For example, this mode makes it easy to see if the notes in a chord start at the exact same beat.

For all of the options except "Part" the pop-up menu also contains a "Setup..." option. This option opens a dialog in which you can specify the colors that are associated with which velocities, pitches, or channels, respectively.

Creating and editing notes

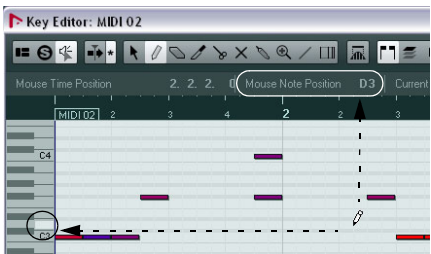
To draw in new notes in the Key Editor, you use the Pencil tool or the Line tool.

Drawing notes with the Pencil tool

With the Pencil tool, you insert single notes by clicking at the desired time (horizontal) and pitch position (vertical).

- When you move the pointer in the note display, its bar position is indicated on the status line, and its pitch is indicated both on the status line and on the piano keyboard to the left.

This makes it easy to find the right note and insert position. For a description of how to show the status line, see ["The status line"](#) on [page 407](#).

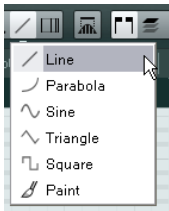


- If Snap is activated, this determines the start position of the created note.
- If you click once, the created note will have the length set on the Length Quantize pop-up menu on the toolbar. You can create a longer note by clicking and dragging. The length of the created note will be a multiple of the Length Quantize value.

Drawing notes with the Line tool

The Line tool can be used for creating series of contiguous notes. To do so, click and drag to draw a line and then release the mouse button.

⇒ To determine another mode for the Line tool you can click on the Line tool and click again to open a pop-up menu where you can select the desired option.



The button will change appearance according to the selected mode.

Mode	Description
Line	This is the default mode for the Line tool. When this mode is selected, you click and drag to create a straight line, in any angle. When you release the mouse button a series of notes will be created, aligned with the line. If Snap is activated, the notes will be spaced and sized according to the Quantize value.
Parabola, Sine, Triangle, Square	These modes insert events along different curve shapes. While they can be used for creating notes, they are probably best suited for controller editing (see "Adding and editing events in the controller display" on page 419).
Paint	Allows you to insert multiple notes by dragging with the mouse button pressed. If Snap is activated, the notes will be positioned and sized according to the Quantize and Length Quantize values. If you press [Ctrl]/[Command] while painting, movement will be restricted to horizontal (i.e. the painted notes will have the same pitch).

Setting velocity values

When you draw notes in the Key Editor, the notes will get the velocity value set in the insert velocity field on the toolbar.

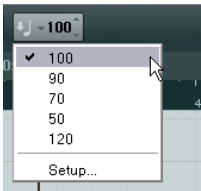
You can use one of four different methods for determining the velocity:

- When a tool modifier is assigned for the Select tool–Edit Velocity action (in the Preferences dialog, Editing–Tool Modifiers page), you can select one or more notes, press the modifier and click on one of the selected notes to change the velocity.

The cursor changes into a speaker and, next to the note, a field with the velocity value appears – the Note Velocity slider. Move the mouse pointer up or down to change the value. Value changes will be applied to all selected notes, as you can see in the controller lane.

- Selecting a predefined velocity value from the insert velocity pop-up menu.

The menu contains five different predefined velocity values. The "Setup..." item opens a dialog that allows you to specify which five velocity values are available on the pop-up menu. (This dialog can also be opened by selecting "Insert Velocities..." from the MIDI menu.)



- Manually entering the desired velocity value by clicking in the insert velocity field and typing in the desired value.

- Using a key command.

You can assign a key command to each of the five available velocity values in the Key Commands dialog (MIDI category – the items Insert Velocity 1–5). This allows for quick switching between different velocity values when entering notes. See ["Setting up key commands"](#) on [page 581](#) for instructions on how to set up key commands.

Selecting notes

Selecting notes is done using any of the following methods:

- Use the Arrow tool.

The standard selection techniques apply, like selecting by clicking on the note or using a selection rectangle. Note that when you press [Shift] and click on notes or draw a selection rectangle, these notes will be added to the overall selection. When you press [Ctrl]/[Command] and click on notes or draw a selection rectangle, these notes will be removed from the overall selection (standard Windows behavior).

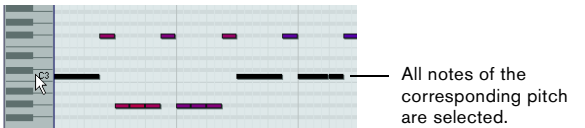
- Use the Select submenu of the Edit menu or context menu.

The Select menu options are:

Option	Description
All	Selects all notes in the edited part.
None	Deselects all events.
Invert	Inverts the selection – all selected events are deselected and all notes that were not selected are selected instead.
In Loop	Selects all notes that are partially or completely inside the boundaries of the left and right locators (only visible if locators are set).
From Start to Cursor	Selects all notes that begin to the left of the project cursor.
From Cursor to End	Selects all notes that end to the right of the project cursor.
Equal Pitch – all Octaves	This function requires that a single note is selected. It selects all notes of this part that have the same pitch (in any octave) as the currently selected note.
Equal Pitch – same Octave	As above, but selects notes of the exact same pitch only (same octave).
Select Controllers in Note Range	Selects the MIDI controller data within range of the selected notes, see below.

- You can also use the left and right arrow keys on the computer keyboard to step from one note to another. If you press [Shift] and use the arrow keys, the current selection will be kept, allowing you to select several notes.

- To select all notes of a certain pitch, press [Ctrl]/[Command] and click on the desired key in the keyboard display to the left.

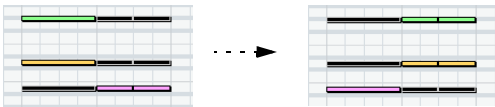


You can also press [Shift] and double-click on a note to select all the following notes of the same pitch – or use the Equal Pitch functions on the Select submenu.

- If the “Auto Select Events under Cursor” option is activated in the Preferences dialog (Editing page), all notes “touched” by the project cursor are automatically selected.

Toggle selections

If you want to toggle the selected elements within a selection rectangle, press [Ctrl]/[Command] and enclose the same elements within a new selection rectangle. Once you release the mouse button, the previous selection is deselected and vice versa.



Selecting controllers within the note range

You can select the controllers within the range of the selected notes. The following applies:

- When the Auto Select Controllers button is activated on the toolbar, the controllers will always be selected when the respective notes are selected.
- When you select “Select Controllers in Note Range” on the Select submenu of the Edit menu, the controllers within the note range (i.e. between the first/leftmost and last/rightmost note) will be selected. Please note that for this to work, only two notes have to be selected. All controllers within this range will be selected.
- A note range lasts until the start of the next note or the end of the part.
- Selected controllers for notes are moved when the corresponding notes are moved.

Moving and transposing notes

To move notes in the editor, use any of the following methods:

- Select the notes and use the buttons on the transpose palette on the toolbar.

- Click and drag to a new position.

All selected notes will be moved, maintaining their relative positions. If Snap is activated, this determines to which positions you can move the notes, see [“Snap”](#) on [page 410](#).

⚠ Note also that you can restrict movement to horizontal or vertical only by holding down [Ctrl]/[Command] while dragging.

- Use the up and down arrow keys on the computer keyboard.

This method allows you to transpose the selected notes, without risking to move them horizontally. You can also use the Transpose function (see [“Transpose”](#) on [page 396](#)) for this. Note that pressing [Shift] and using the up and down arrow keys will transpose notes in steps of one octave. Transpose is also affected by the global transpose setting, see [“The transpose functions”](#) on [page 129](#).

- Use the Move to Cursor function on the Edit menu.

This moves the selected notes to the project cursor position.

- Select a note and adjust its position or pitch on the info line.

See [“Editing on the info line”](#) on [page 415](#).

- Use the Move buttons in the Nudge palette on the toolbar.

This moves the selected note(s) by the amount set on the Quantize pop-up menu.

By default, the Nudge palette is not shown on the toolbar – see [“Using the Setup options”](#) on [page 572](#) for more information.

⇒ Note that when you move selected notes to a different position, any selected controllers for these notes will move accordingly. For further information, see also [“Moving and copying events”](#) on [page 420](#).

You can also adjust the position of notes by quantizing (see [“The quantizing functions”](#) on [page 392](#)).

Duplicating and repeating notes

Notes are duplicated much in the same way as events in the Project window:

- Hold down [Alt]/[Option] and drag the note(s) to a new position.

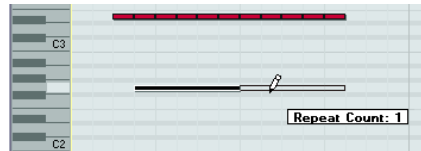
If Snap is activated, this determines to which positions you can copy notes (see [“Snap”](#) on [page 410](#)).

- Selecting Duplicate from the Edit menu creates a copy of the selected note and places it directly after the original. If several notes are selected, all of these are copied “as one unit”, maintaining the relative distance between the notes.

- Selecting “Repeat...” from the Edit menu opens a dialog, allowing you to create a number of copies of the selected note(s).

This works like the Duplicate function, but you can specify the number of copies.

- You can also perform the Repeat function by dragging: Select the note(s) to repeat, press [Alt]/[Option], click the right edge of the last selected note and drag to the right. The longer to the right you drag, the more copies are created (as indicated by the tooltip).

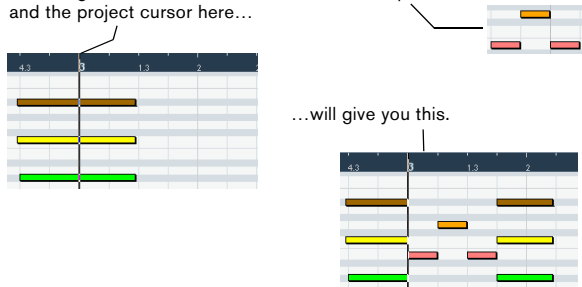


Using cut and paste

You can use the Cut, Copy and Paste options on the Edit menu to move or copy material within a part or between different parts. When you paste copied notes, you can either use the regular Paste function or the function “Paste Time” from the Range submenu of the Edit menu.

- “Paste” inserts the copied notes at the project cursor position without affecting existing notes.
- “Paste Time” inserts at the project cursor position, but moves (and if necessary, splits) existing notes to make room for the pasted notes.

Selecting “Paste Time” with this data on the clipboard and the project cursor here...



...will give you this.

Resizing notes

To resize a note, use one of the following methods:

- Position the arrow tool at the start or end of the note, so that the pointer takes on the shape of a small double arrow. Click and drag to the left or right to resize the note. This method allows you to resize the note from either direction.
- Click with the Pencil tool within the note box and drag to the left or the right (to make the note shorter or longer, respectively).

With both these methods, the resulting length will be a multiple of the Length Quantize value on the toolbar.

- Use the Trim Start/End buttons on the Nudge palette on the toolbar.

This resizes the selected note(s) by moving their start or end positions, in steps according to the Length Quantize value on the toolbar. By default, the Nudge palette is not shown on the toolbar – see [“Using the Setup options”](#) on [page 572](#) for more information.

- Select the note and adjust its length on the info line. See [“Editing on the info line”](#) on [page 415](#) for details on info line editing.
- Use the Trim tool, see [“Using the Trim tool”](#) on [page 408](#).

Splitting notes

There are three ways to split notes:

- Clicking on a note with the Scissors tool splits the note at the position you pointed (taking the Snap setting into account if activated).

If several notes are selected, they are all split at the same position.

- If you select “Split at Cursor” from the Edit menu, all notes that are intersected by the project cursor are split at the cursor position.

- If you select “Split Loop” from the Edit menu, all notes that are intersected by the left or right locator are split at the locator positions.

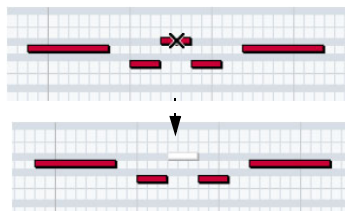
Gluing notes

Clicking on a note with the Glue Tube tool will “glue it together” with the next note of the same pitch. The result will be one long note spanning from the start of the first note to the end of the second note and with the properties (velocity, etc.) of the first note.

Muting notes

Individual notes can be muted in the Key Editor, as opposed to muting an entire MIDI part in the Project window. This allows you to exclude notes from playback, but keep the option to bring them back again at any time. To mute a note, use one of the following methods:

- Click on it with the Mute tool.
- Drag a rectangle with the Mute tool, enclosing all notes you want to mute.
- Select the note(s) and choose Mute from the Edit menu. The default key command for this is [Shift]-[M].



Muted notes are “dimmed” in the note display.

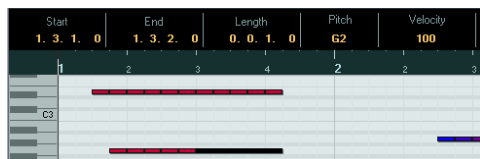
To unmute a note, either click it or enclose it with the Mute tool, or select it and choose Unmute from the Edit menu. The default key command for this is [Shift]-[U].

Deleting notes

To delete notes, either click on them with the Erase tool or select them and press [Backspace].

Editing on the info line

The info line shows the values and properties of the selected events. If a single event is selected, its values are displayed on the info line. If several events are selected, the info line shows the values of the first of these events (in color).



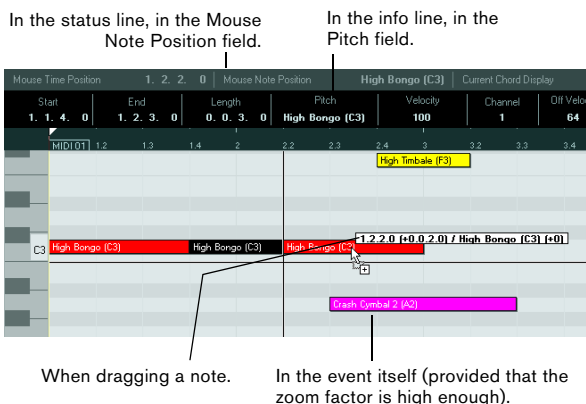
You can edit the values on the info line using regular value editing. This allows you to move, resize, transpose or change velocity of events in a very precise manner. It is also possible to click in the Pitch or Velocity field in the info line and play a note on your MIDI keyboard – the pitch or velocity will be adjusted accordingly.

- ⇒ If you have several events selected and change a value, all selected events will be changed by the set amount.
- ⇒ If you have several events selected, hold down [Ctrl]/[Command] and change a value, the change will be absolute. In other words, the value setting will be the same for all selected events.

How the Key Editor handles drum maps (Nuendo Expansion Kit only)

When a drum map is assigned to a MIDI or instrument track (see the chapter “Editing Drums” in the NEK manual), the Key Editor will display the drum sound names as defined by the drum map.

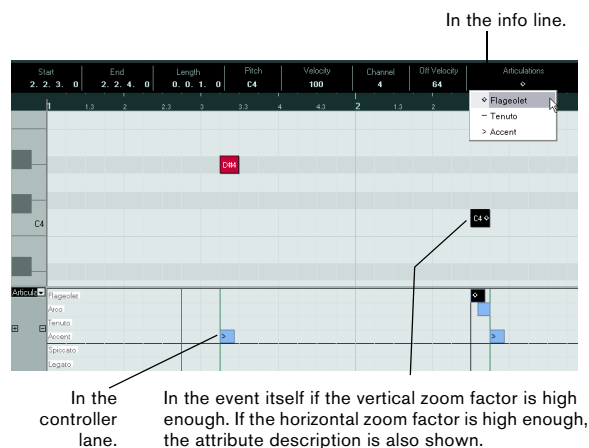
In Nuendo, the name of the drum sound is displayed in the following locations:



This allows you to use the Key Editor for drum editing, e.g. when editing drum note lengths (which may be necessary for some external instruments) or when editing several parts, to identify drum events.

How the Key Editor handles expression maps (Nuendo Expansion Kit only)

When an expression map is assigned to a MIDI track (see the chapter “VST Expression” in the NEK manual), the musical articulations defined for that map are displayed in the following locations of the Key Editor:

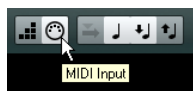


For more information, see the chapter “VST Expression” in the Nuendo Expansion Kit manual.

Editing notes via MIDI

You can change the properties of notes via MIDI. For example, this can be a fast way to get the right velocity value, since you will hear the result even as you edit:

1. Select the note you want to edit.
2. Click the MIDI Input button on the toolbar to enable editing via MIDI.



3. Use the note buttons on the toolbar to decide which properties are changed by the MIDI input.

You can enable editing of pitch, note-on and/or note-off velocity.



With this setting, the edited notes will get the pitch and velocity values of the notes input via MIDI, but the note-off velocities will be kept as they are.

4. Play a note on your MIDI instrument.

The note selected in the editor will get the pitch, velocity and/or note-off velocity of the played note.

The next note in the edited part is automatically selected, making it easy to quickly edit a series of notes.

- If you want another try, select the note again (e.g. by pressing the left arrow key on the computer keyboard) and again play a note on your MIDI instrument.

Step input

Step input, or step recording, is when you enter notes one at a time (or one chord at a time) without worrying about the exact timing. This is useful, for example, when you know the part you want to record but are not able to play it exactly as you want it.

Proceed as follows:

1. Click the Step Input button on the toolbar to activate Step Input mode.



2. Use the note buttons to the right to decide which properties are included when you input the notes. For example, you may not want to include the velocity and/or note-off velocity of the played notes. It is also possible to turn off the pitch property, in which case all notes will get the pitch C3, no matter what you play.

3. Click anywhere in the note display to set the start position (the desired position of the first note or chord). The step input position is shown as a blue line in the note display.

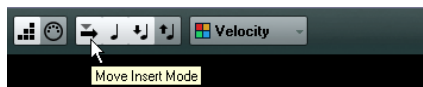


4. Specify the desired note spacing and length with the Quantize and Length Quantize pop-up menus.

The notes you input will be positioned according to the Quantize value and have the length set with the Length Quantize value. For instance, if you set Quantize to 1/8 notes and Length Quantize to 1/16 note, the notes will be sixteenth notes, appearing on each eighth note position.

5. Play the first note or chord on your MIDI instrument. The note or chord appears in the editor and the step input position advances one quantize value step.

⇒ If Move Insert Mode is activated, all notes to the right of the step input position will be moved to “make room” for the inserted note or chord.



Move Insert Mode is activated.

6. Continue in the same way with the rest of the notes or chords.

You can adjust the Quantize or Length Quantize value as you go along, to change the timing or note lengths. You can also move the step input position manually by clicking anywhere in the note display.

- To insert a “rest”, press the right arrow key on the computer keyboard.

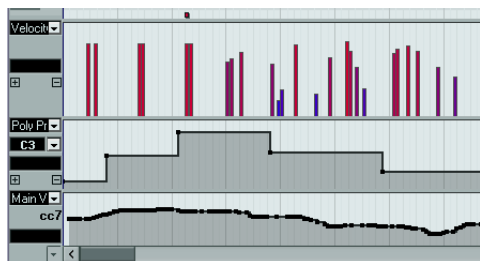
This advances the step input position one step.

7. When you are done, click the Step Input button again to deactivate step input.

Editing in the controller display

About controller lanes

By default, the controller display has a single lane, showing one event type at a time. However, you can add lanes by clicking the “+” button or by opening the context menu and selecting “Create New Controller Lane”. The use of several controller lanes allows you to view and edit different controllers at the same time.



The controller display with three lanes set up

- To remove a lane, click on the “-” sign or open the context menu and select “Remove this Lane”.

This hides the lane from view – it does not affect the events in any way.

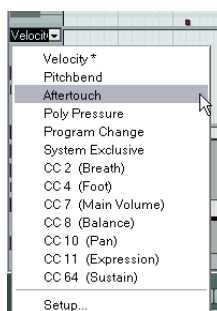
- If you remove all lanes, the controller display will be completely hidden.

To bring it back again, select “Create New Controller Lane” from the context menu.

- Editing the events in the controller display is much like editing automation data on an automation track in the Project window (except for velocity values, see “Editing velocity values” on page 418).

Selecting the event type

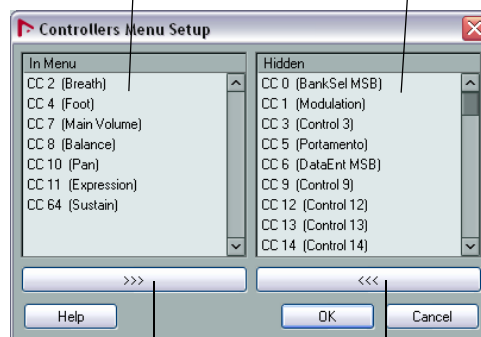
Each controller lane shows one event type at a time. To select which type is displayed, use the event type pop-up menu to the left of the lane.



- Selecting “Setup...” opens a dialog in which you can specify which continuous controller event types are available on the pop-up menu.

Controller types in this list are already listed on the pop-up menu.

Controller types in this list are not listed on the pop-up menu.



Click this button to remove the controller type selected in the left list from the pop-up menu.

Click this button to add the selected controller type to the pop-up menu.

- Each MIDI track has its own controller lane setup (number of lanes and selected event types).

When you create new tracks, they get the controller lane setup used last.

Controller lane presets

Once you have added the required number of controller lanes and selected the event types you need, you can store this combination as a controller lane preset. For example, you can have a preset with one velocity lane only, another with a combination of velocity, pitchbend and modulation, and so on. This can make working with controllers much quicker.

- To add the current controller lane setup as a preset, pull down the pop-up menu to the left of the horizontal scrollbar and select “Add”.

A dialog opens, where you can enter a name for the preset.

- To apply a stored preset, select it from the pop-up menu.

This immediately brings up the controller lanes and event types in the preset.

- To remove or rename presets, select “Organize...” from the pop-up menu.

Editing velocity values

When “Velocity” is selected, the lane shows the velocity of each note as a vertical bar.



Velocity values are edited with the Pencil or the Line tool. The different tools and Line tool modes offer several possibilities, as listed below:

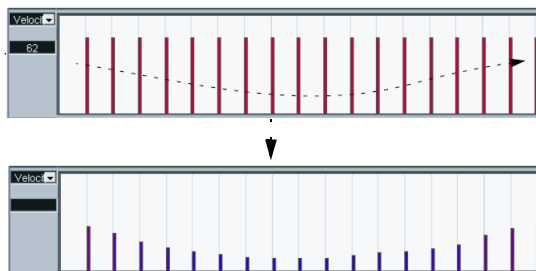
- ⇒ The Arrow tool automatically switches to the Pencil tool when you move the pointer into the controller display. If you want to use the Arrow tool to select events in the controller display, press [Alt]/[Option].
- ⇒ If the Speaker icon (Acoustic Feedback) is activated on the toolbar, the notes will be played back when you adjust the velocity, allowing you to audition your changes.

- You can use the Pencil tool to change the velocity of a single note: click on its velocity bar and drag the bar up or down.

While you drag, the current velocity value is shown in the display to the left.

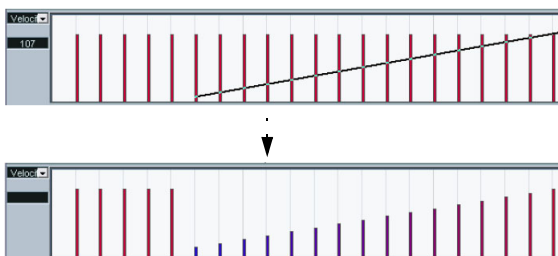
- You can use the Pencil tool or the Line tool in Paint mode to change the velocity values of several notes by painting a “freehand curve”.

When editing velocity, these two methods have the same functionality.



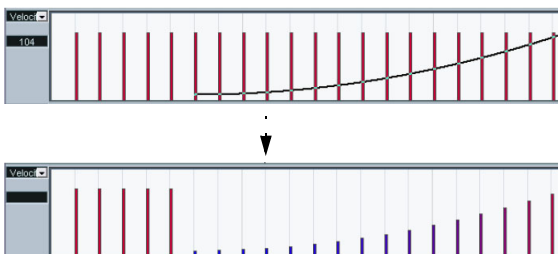
- Use the Line tool in Line mode for creating linear velocity ramps.

Click where you want the ramp to start and drag the cursor to where you want the ramp to end. When you release the mouse button, the velocity values are aligned with the line between the two points.



- Parabola mode works in the same way, but aligns the velocity values to a Parabola curve instead.

Use this for smooth, “natural” velocity fades, etc.



- The remaining three Line tool modes (Sine, Triangle and Square) align the velocity values to continuous curve shapes (see below).

⇒ If there is more than one note at the same position (e.g. a chord), their velocity bars will overlap in the controller lane. If none of the notes are selected, all notes at the same position will be set to the same velocity value when you draw. To edit the velocity of only one of the notes at the same position, first select the note in the note display. Now, editing will only affect the velocity of the selected note.

You can also adjust the velocity of a single note by selecting it and changing its velocity value on the info line.

Editing articulations (Nuendo Expansion Kit only)

It is also possible to add and edit musical expressions or articulations in the controller lane. This is described in detail in the chapter “VST Expression” in the Nuendo Expansion Kit manual.

Adding and editing events in the controller display

When any option other than “Velocity” is selected for a controller lane, you can create new events or edit the values of existing events using the Pencil tool or the Line tool in its various modes:

- Click with the Pencil tool or the Line tool in Paint mode to create a new event.
- Press [Alt]/[Option] and use the Pencil tool or the Line tool in Paint mode to modify the value of an event (without creating a new one).

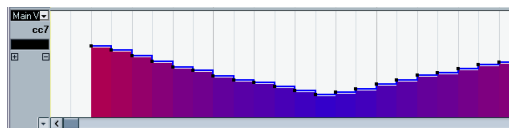
Note that you can click and drag to change or add multiple events, draw controller curves, etc. You can press or release [Alt]/[Option] while drawing, switching dynamically between “edit mode” and “create mode”.

If you want to enter or adjust a single event, click once with the Pencil tool or the Line tool in Paint mode.



When you move the pointer in the controller lane, the corresponding value is displayed in this field.

If you want to “paint a curve”, drag with the tool in the controller lane (keeping the mouse button pressed):



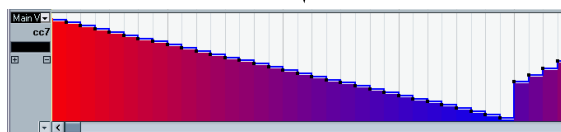
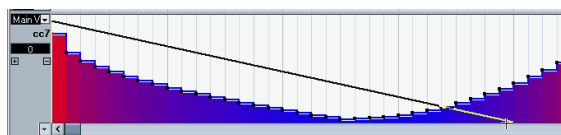
⇒ With the Pencil tool and the Line tool in Paint mode, the quantize value determines the “density” of created controller curves (if Snap is activated, see “[Snap](#)” on [page 410](#)). For very smooth curves, use a small quantize value or turn off Snap. However, this will create a very large number of MIDI events, which can cause MIDI playback to “stutter” in some situations. A medium-low density is often sufficient.

- Clicking and dragging with the Line tool in Line mode shows a line in the controller lane, and creates events with values aligned to this line.

This is the best way to draw linear controller ramps. If you press [Alt]/[Option], no new events are created – use this mode for modifying existing controller curves.

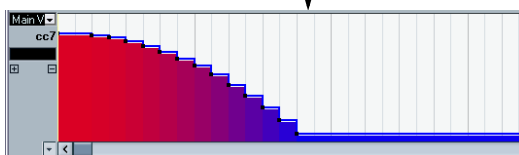
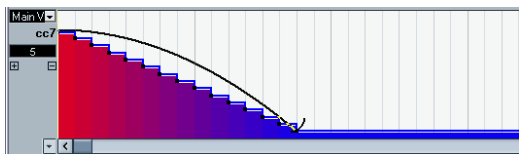


Converting a controller curve to a ramp using the Line tool.



- The Parabola mode works in the same way, but aligns the values to a parabola curve instead, giving more “natural” curves and fades.

Note that the result depends on the direction from which you draw the parabola.



- In Parabola mode, you can use modifier keys to determine the shape of the parabola curve.

If you press [Ctrl]/[Command], the parabola curve will be reversed. If you press [Alt]/[Option]-[Ctrl]/[Command] while Snap is activated, you can change the position of the whole curve (in both cases the snap value for the positioning will be a quarter of the quantize value). If you press [Shift], the exponent will be increased or decreased.

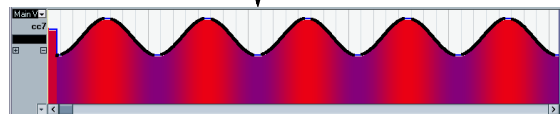
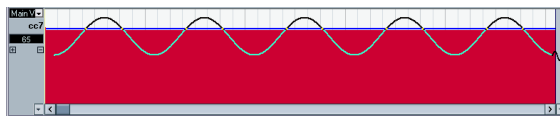
⇒ In Line and Parabola modes, the length quantize value determines the “density” of created controller curves (if Snap is activated). For very smooth curves, use a small length quantize value or turn off Snap. To avoid over-dense controller curves (which may cause MIDI playback to “stutter”), use a medium-low density.

- The Sine, Triangle and Square modes create events with values aligned to continuous curves.

In these modes, the quantize value determines the period of the curve (the length of one curve “cycle”) and the length quantize value determines the density of the events (the lower the length quantize note value, the smoother the curve).

- In Sine, Triangle and Square mode you can also use modifier keys to determine the shape of the curve.

If you press [Ctrl]/[Command] you can change the phase of the beginning of the curve, if you press [Alt]/[Option]-[Ctrl]/[Command] while snap is activated you can change the position of the whole curve (in both cases the snap value for the positioning will be a quarter of the quantize value).



⇒ You can also set the curve period freely by holding down [Shift] when you insert events in Sine, Triangle or Square mode. Activate Snap, [Shift]-click and drag to set the length of one period. The period length will be a multiple of the quantize value.

- In Triangle and Square mode, you can press [Shift]-[Ctrl]/[Command] to change the maximum position of the triangle curve (to create sawtooth curves) or the pulse of the square curve. As in other modes, you can press [Alt]/[Option] if you want to change the existing events rather than creating new ones. Again, the snap value for the positioning will be a quarter of the quantize value.

Moving and copying events

You can move or duplicate events in a controller lane, much like you can with notes:

1. Click with the Arrow tool to select the events you want to cut or copy.

You can also click and drag to create a selection rectangle encompassing the desired events.

2. Click on a curve point and drag the events to move them.

If Snap is activated, this determines to which positions you can move the events (see “[Snap](#)” on [page 410](#)).



Remember that a non-note event does not have a length – it is “valid” until the next event (see “[The controller display](#)” on [page 408](#)).

⚠ When the Auto Select Controllers button is activated in the Key Editor toolbar, selecting notes will also select the corresponding controller events. Moving events (either using cut/copy/paste or drag & drop) in the note display will also move the corresponding controller events (see also [“Selecting controllers within the note range”](#) on page 412).

Using cut, copy and paste

You can use the standard Cut, Copy and Paste options on the Edit menu to move or copy events in the controller display:

1. Select the events you want to cut or copy.
2. Select Cut or Copy from the Edit menu.
3. If you want to paste the events into another MIDI part, open that part in another Key Editor window.
4. Position the project cursor where you want to paste the events.

5. Select Paste from the Edit menu.

The events on the clipboard are added, starting at the project cursor position, maintaining their relative distances. If a pasted event ends up at the same position as an existing event of the same type, the old event is replaced.

Deleting events in the controller display

You delete events by clicking on them with the Erase tool or by selecting them and pressing [Backspace]. Please note:

- Deleting a controller event makes the last event before this valid up until the next event. It does not “zero” any controller changes.
- You can delete notes by deleting their velocity bars in the controller display.

Please be aware that if there is more than one note on the same position, there may still only be one velocity bar visible – make sure that you delete only the desired notes!

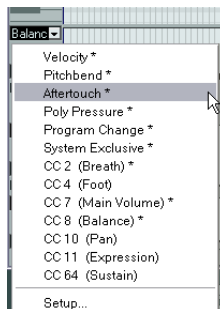
Editing continuous controllers on the controller lane

When a continuous controller is selected for a controller lane, additional data is displayed on the controller lane. This is due to the fact that MIDI controller data can be recorded (or entered) either for an automation track or for a MIDI part (see [“MIDI controller automation”](#) on page 261).

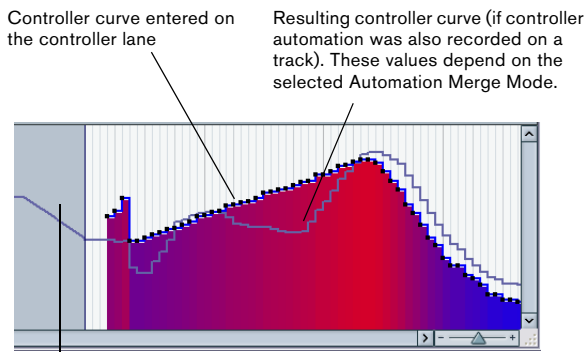
The following applies:

- In the event type pop-up menu, an asterisk is displayed next to the controller name if automation data already exists for this controller.

This can be either controller data you entered in a MIDI editor (the data will then be displayed on the controller lane), or controller data recorded on an automation track in the Project window (in which case no events are displayed on the controller lane).



- If conflicting controller data exists in two different places, you can specify what will happen on playback by making settings for the Automation Merge Mode (see [“Merging automation data”](#) on page 261). The resulting curve is displayed in addition to the curve you entered on the controller lane.



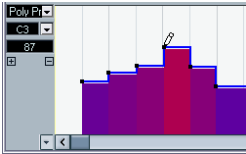
The controller curve before the part starts. This curve depends on the existing controller data (if any) and on the selected Merge Mode.

- On the controller lane, you can also see the controller curve that is applied before the part starts. That way, you know which controller value (if any) is currently being used at the starting point of the part so that you can choose the start value accordingly.

Note that this value also depends on the Automation Merge Mode.

Adding and editing Poly Pressure events

Poly Pressure events are special, in that they “belong to” a specific note number (key). That is, each Poly Pressure event has two editable values: the note number and the amount of pressure. Therefore, when Poly Pressure is selected on the event type pop-up menu, there are two value fields to the left of the controller display, one for the note number and one for the amount.



To add a new Poly Pressure event, proceed as follows:

1. Select Poly Pressure on the event type pop-up menu.
2. Set the note number by clicking on the keyboard display.

The selected note number is displayed in the upper value field to the left of the controller display. Note that this only works for the topmost lane. If you have selected “Poly Pressure” for several controller lanes, you have to type in the desired note number directly in the lower value field to the left of each lane.

3. Use the Pencil tool to add a new event, just as when adding regular controller events.

To view and edit existing Poly Pressure events, proceed as follows:

1. Select Poly Pressure on the event type pop-up menu.
2. Click on the arrow button next to the note number field to the left of the controller lane.

A pop-up menu appears, listing all note numbers for which there already are Poly Pressure events.

3. Select a note number from the pop-up menu.

The Poly Pressure events for the selected note number are shown in the controller lane.

4. Use the Pencil tool to edit the events as usual.

Press [Alt]/[Option] to edit existing events without adding any new ones.

- Poly Pressure events can also be added and edited in the List Editor.

The In-Place Editor

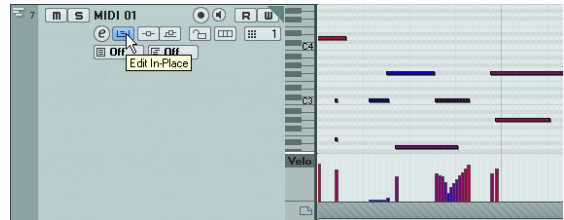
The In-Place Editor makes it possible to edit MIDI parts directly in the Project window, for quick and efficient editing in context with other tracks.

To open the In-Place Editor for one or more selected tracks, you have the following possibilities:

- Select “Open In-Place Editor” on the MIDI menu.
- Use the Edit In-Place key command, by default [Ctrl]/[Command]-[Shift]-[I].
- To open the In-Place Editor for a single MIDI track, click the corresponding Edit In-Place button in the track list (if necessary, expand the track list to display the button).



This expands the MIDI track to show something like a miniature Key Editor, allowing you to edit MIDI notes and controllers.



- To zoom or scroll the In-Place Editor, point at the left part of the piano keyboard display so that the pointer changes to a hand. Now you can click and drag to the right or left to zoom in or out vertically, and drag up or down to scroll the editor.
- Clicking on the gray triangle in the upper right corner of the track list for the edited track brings up a local toolbar with some settings specific to the In-Place Editor.



For descriptions of these settings, see “The toolbar” on [page 406](#).

- Just like in the Key Editor, you can edit velocity or continuous controllers at the bottom of the In-Place Editor.

To change which controller type is shown, click in the controller name field directly below the piano keyboard and select a controller type from the pop-up menu. To add or remove controller lanes, right-click below the controller name field and select an option from the context menu.

- When you select a MIDI note, the Project window info line shows information about that note, just like the info line in the Key Editor.

You can perform the same editing here as on the Key Editor info line, see [“Editing on the info line”](#) on [page 415](#).

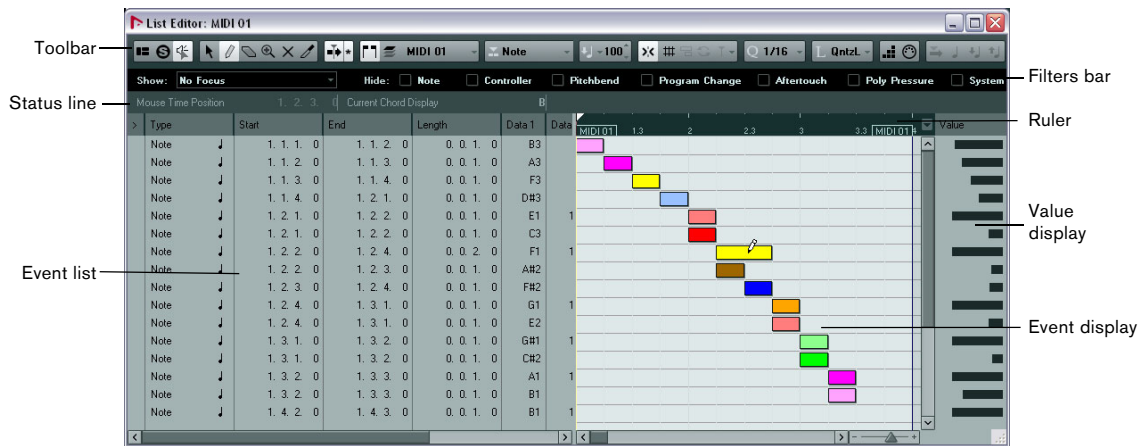
- The Snap button and Snap Type pop-up menu on the Project window toolbar govern snapping in the In-Place Editor, but the snap grid is set using the Quantize pop-up menu.
- To close the In-Place Editor for one or several selected tracks, you can use the Edit In-Place key command, by default [Ctrl]/[Command]-[Shift]-[I].
- To close the In-Place Editor for one track, you can click the Edit In-Place button in the track list or double-click below the controller display in the In-Place Editor.

Working with parts

If you work with parts in the In-Place Editor, the following editing functions are available:

- You can change the length of the parts by clicking on the lower part edges (so that the mouse pointer changes to a double arrow) and dragging it to the left or right.
- You can drag and drop notes between parts.
- You can change the length of notes by clicking on them and dragging the double arrow to the left or right.

The List Editor – Overview



The toolbar

The toolbar contains several items that are the same as in the Key Editor (edit solo, snap, quantize settings, etc.). These are described earlier in this chapter. The following toolbar items are unique to the List Editor:

- The Insert pop-up menu is used when creating new events.
This is where you determine what type of event to add (see [“Inserting events”](#) on [page 425](#)).
- The List Editor contains an additional Value display (see below).

The List Editor has no info line (numerical editing is available in the list instead).

⇒ If you see an empty or incomplete list of items although the items are visible in the Key Editor, check if you have activated any filters (see [“Filtering”](#) on [page 426](#)).

The Filters bar

Similar to the sections in the Project window, the Filters bar can be shown/hidden via the “Set up Window Layout” button (see [“The status line”](#) on [page 407](#)). The Filters bar allows you to hide events from view, based on their type and other properties (see [“Filtering”](#) on [page 426](#)).

The status line

This is the same as in the Key Editor (see [“The status line”](#) on [page 407](#)), except for the Current Note Position option, which is not available in the List Editor.

The event list

This lists all events in the selected MIDI part(s), in the order (from top to bottom) in which they are played back. You can edit the event properties by using regular value editing, see [“Editing in the list”](#) on [page 425](#).

The event display

This shows the events graphically. The vertical position of an event in the display corresponds to its entry in the list (i.e. to the playback order), while the horizontal position corresponds to its actual position in the project. This is where you add new parts or events, drag to move them, etc.

The value display

This display shows the “value” of each event, allowing for easy viewing and graphical editing. Typically, the value shown is the “Data 2” or “Value 2” property (amounts to MIDI controller events, velocity for notes, etc.). You can show or hide this display by clicking the “Show List Value View” button on the toolbar.

List Editor operations

Customizing the view

You can click and drag the divider between the list and the event display to make one area wider and the other narrower. Furthermore, the list can be customized in the following ways:

- You can change the order of the columns by dragging the column headings.
- You can resize columns by dragging the dividers between the column headings.

Setting the display format

Just like in the Project window, you set the display format (bars+beats, seconds, etc.) by right-clicking in the ruler and selecting an option from the pop-up menu. This setting affects both the ruler and all start, end and length values shown in the list.

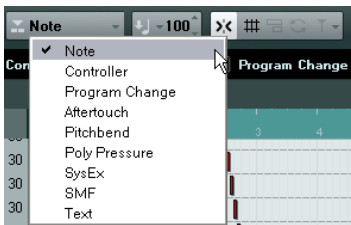
Zooming

You can change the horizontal magnification in the event display by using the zoom slider below the display or the Zoom tool (the magnification glass).

Inserting events

To add a new event to the edited part, proceed as follows:

1. Use the Insert Type pop-up menu on the toolbar to select the event type.



2. Select the Pencil tool and click in the event display at the desired position (relative to the ruler).
If you are creating note events, you can click and drag to set the length of the note.

The new event appears in the list and in the display. Its properties will be set to default values, but can be adjusted in the list.

- Notes will get the insert velocity value set in the insert velocity field on the toolbar, see [“Setting velocity values”](#) on [page 411](#).

Editing in the list

The list allows you to perform detailed numerical editing of the events properties. The columns have the following functionality:

Column	Description
L	An arrow in this column indicates the event that starts closest before the project cursor position. If you click in this column for an event, the project cursor is moved to the start of that event. Double-clicking moves the cursor position and starts/stops playback – useful for auditioning when editing in the list.
Type	The event type. This cannot be changed.
Start	The start position of the event, shown in the format selected for the ruler. Changing this is the same as moving the event. Note that moving the event past any other event in the list will re-sort the list (the list always shows the events in the order they are played back).
End	This is only used for note events, allowing you to view and edit the end position of a note (thereby resizing it).
Length	This is only used for note events. It shows the length of the note – changing this resizes the note and automatically changes the End value as well.
Data 1	This is the “data 1” or “value 1” property of the event. The content of this depends on the event type – for notes, this is the pitch, for example. Where applicable, the values are shown in the most relevant form. For instance, the Data 1 value for notes is shown as a note number in the format selected in the Preferences dialog (Event Display–MIDI page). For further information, see also the table in the section “Editing in the value display” on page 427 .
Data 2	This is the “data 2” or “value 2” property of the event. The content of this depends on the event type – for notes, this is the note-on velocity value, for example. For further information, see also the table in the section “Editing in the value display” on page 427 .
Data 3	This is the “data 3” or “value 3” property of the event. This value is only used for note events, where it corresponds with the note-off velocity.
Channel	The MIDI channel of the event. Note that this setting is normally overridden by the channel setting for the track. To make a MIDI event play back on “its own” channel, set its track to channel “Any” in the Project window.
Comment	This column is used for some event types only, providing an additional comment about the event.

- You can edit several events at once. If several events are selected and you edit a value for one event, the other selected events' values will be changed as well.

Normally, any initial value differences between the events will be maintained – i.e. the values will change by the same amount. If you press [Ctrl]/[Command] when you edit, however, all events will get the same value.

⇒ For SysEx (system exclusive) events, you can only edit the position (Start) in the list. However, when you click the Comment column, the MIDI SysEx Editor opens, in which you can perform detailed editing of system exclusive events (see “[Working with SysEx messages](#)” on [page 427](#)).

Editing in the event display

The event display allows you to edit the events graphically using the tools on the toolbar. You can edit single events as well as several selected events simultaneously.

- To move an event, click and drag it to a new position. Note that moving the event past any other event in the display will re-sort the list (the list always shows the events in the order they are played back). As a result, the vertical position of the event in the display will change as well.

- To make a copy of an event, press [Alt]/[Option] and drag it to a new position.

- To resize a note, select it and drag its end point with the Arrow tool as in the Project window.

This only works with notes.

- To mute or unmute an event, click on it with the Mute tool.

You can mute or unmute several events in one go by enclosing them in a selection rectangle with the Mute tool.

- You can select a color scheme for the events with the Event Colors pop-up menu on the toolbar.

This affects how all MIDI events are shown in the List and Key editors – see “[Coloring notes and events](#)” on [page 410](#).

- To delete an event, select it and press [Backspace] or [Delete], or click on it with the Erase tool in the event display.

Filtering

The Filters bar is displayed below the toolbar in the List Editor. It contains two sections. On the left, you can find controls for setting up complex filters, and on the right, you can exclude certain event types from being displayed.



To show or hide the Filters bar, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Filters option.

The Show section (complex filtering)

On the left of the Filters bar, you find the Show pop-up menu. This can be used to filter the event display based on complex criteria. Proceed as follows:

1. Select one or more events that have the desired properties.
 2. Pull down the Show pop-up menu and select one of the options.
- In the top section, the following options are available:

Option	Description
No Focus	Select this to deactivate this filtering function.
Event Types	Only events with the type of the selected event will be shown. This is the same as activating event types in the Hide section.
Event Types and Data 1	Only events of the same type and with the same “Data 1” value will be shown. For example, if a note event is selected, only notes with the same pitch are shown. If a controller event is selected, only controllers of the same type are shown.
Event Channels	Only events with the same MIDI channel value as the selected event will be shown.

- In addition to these options, the menu also gives you access to the presets available in the Logical Editor. Using the “Setup...” item, you can directly open the Logical Editor. In this editor, you can create very complex filter settings (see the chapter “[The Logical Editor, Transformer, and Input Transformer](#)” on [page 431](#)).

When you apply any of the Logical presets or use the Logical Editor to create filter settings yourself, only the events that meet the specified criteria will be visible.

The Hide section (filtering out event types)

The Hide section on the Filters bar allows you to hide specific event types from view. For example, it may be hard to find note events if the part contains a lot of controller data. By hiding the controllers, the list becomes more manageable.

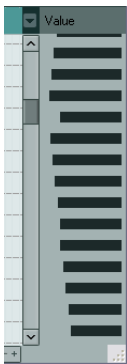
- To hide an event type, activate the corresponding checkbox on the Filters bar.
- To hide all event types except one, press [Ctrl]/[Command] and click the checkbox of the event type you want to view. If you [Ctrl]/[Command]-click again, all checkboxes are cleared.

⇒ The event types remain hidden even if you hide the Filters bar. To make sure that you see all events, show the Filters bar and verify that all checkboxes are deactivated and that the Show pop-up menu is set to “No Focus”.

⇒ Filtering events out does not remove, mute, or change the events in any way.

Editing in the value display

The value display to the right of the event display is a tool for quick viewing and editing of multiple values, e.g. velocities or controller amounts. The values are shown as horizontal bars, with the bar length corresponding to the value.



A velocity ramp in the value display

You edit the values by clicking and dragging. Note that the pointer automatically takes on the shape of the Pencil tool when you move it over the value display – you do not have to select the Pencil tool for this.

- To show or hide the value display, click the “Set up Window Layout” button on the toolbar and activate or deactivate the Value Display option.

Exactly which value is shown for an event depends on the event type. The following table shows what is displayed and edited in the Data columns and the value display:

Event type	Data 1	Data 2	Value display
Note	Pitch (note number)	Note-on velocity	Velocity
Controller	Controller type	Controller amount	Controller amount
Program Change	Program number	Not used	Program number
Aftertouch	Aftertouch amount	Not used	Aftertouch amount
Pitchbend	Bend amount	Not used	Bend amount
SysEx	Not used	Not used	Not used

- For note events there will also be a value in the Data 3 column, which is used for note-off velocity.
- Note that for SMF and text events no values are displayed.

Working with SysEx messages

SysEx (System Exclusive) messages are model-specific messages for setting various parameters of a MIDI device. This makes it possible to address device parameters that would not be available via normal MIDI syntax.

Every major MIDI manufacturer has its own SysEx identity code. SysEx messages are typically used for transmitting patch data, i.e. the numbers that make up the settings of one or more sounds in a MIDI instrument.

Nuendo allows you to record and manipulate SysEx data in various ways. The following sections point to various features that help you manage and create SysEx data.

To learn about the possibilities of the MIDI Device Manager for controlling your device, see the chapter [“Using MIDI devices”](#) on [page 380](#).

Bulk dumps

Recording a bulk dump in Nuendo

In any programmable device, the settings are stored as numbers in computer memory. Change those numbers, and you will change the settings.

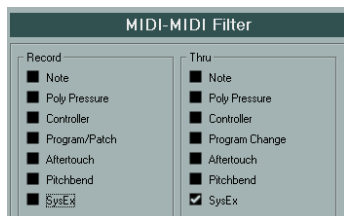
Normally, MIDI devices allow you to dump (transmit) all or some settings in the device's memory in the form of MIDI SysEx messages. A dump is therefore (among other things) a way of making backup copies of the settings of your instrument: sending such a dump back to the MIDI device will restore the settings.

If your instrument allows the dumping of a few or all of its settings via MIDI by activating some function on the front panel, this dump will probably be recordable in Nuendo.

1. Open the Preferences dialog from the File menu (on the Mac, this is located on the Nuendo menu) and select the MIDI-MIDI Filter page.

This allows you to govern which MIDI event types are recorded and/or thru-put.

2. Make sure that recording of SysEx data is not filtered, by deactivating the SysEx checkbox in the Record section. The SysEx checkbox in the Thru section can be left as it is (by default activated).



This way, SysEx messages will be recorded but not echoed back out to the instrument (which might lead to unpredictable results).

3. Activate recording on a MIDI track and initiate the dump from the front panel of the instrument.

4. When done recording, select the new part and open the List Editor from the MIDI menu.

This allows you to check that the SysEx dump was recorded – there should be one or several SysEx events in the part/event list.

Type	Start	End	Comment
Note	1. 2. 1. 90	1. 2. 2. 0	
SysEx	1. 2. 1. 90	1. 2. 2. 0	F0F7
Note	1. 2. 2. 0	1. 2. 2. 30	

- ⚠ If your MIDI instrument does not offer a way to initiate a dump “by itself”, you have to send a Dump Request message from Nuendo to start the dump. In that case, use the MIDI SysEx Editor (see [“Editing SysEx messages”](#) on [page 429](#)) to insert the specific Dump Request message (see the instrument's documentation) at the beginning of a MIDI track. When you activate recording, the Dump Request message will be played back (sent to the instrument), the dump will start and be recorded as above.

Transmitting a bulk dump back to a device

1. Make sure that the MIDI track with the System Exclusive data is routed to the device.

You may want to check your device's documentation to find details about which MIDI channel should be used, etc.

2. Solo the track.

This might not be necessary, but it is a good safety measure.

3. Make sure that the device is set up to receive SysEx messages (often, receiving SysEx is turned off by default).

4. If necessary, put the device in “Standby to Receive System Exclusive” mode.

5. Play back the data.

Some advice

- Do not transmit more data than you need. If all you want is a single program, do not send them all, it will only make it harder to find the one you want. Usually, you can specify exactly what you want to send.
- If you want the sequencer to dump the pertinent sounds to your instrument each time you load a project, put the SysEx data in a silent “count-in” before the project itself starts.

- If the dump is very short (for instance, a single sound) you can put it in the middle of the project to re-program a device on the fly. However, you can achieve the same effect by using Program Change. This is definitely preferable, since less MIDI data is sent and recorded. Some devices may be set up to dump the settings for a sound as soon as you select it on the front panel.
- If you create parts with useful SysEx dumps, you can put these on a special muted track. When you want to use one of them, drag it to an empty unmuted track and play it back from there.
- Do not transmit several SysEx dumps to several instruments at the same time.
- Make a note of the current device ID setting of the instrument. If you change this, the instrument may refuse to load the dump later.

Recording SysEx parameter changes

Often you can use SysEx to remotely change individual settings in a device, e.g. open a filter, select a waveform, change the decay of the reverb, etc. Many devices are also capable of transmitting changes made on the front panel as SysEx messages. These can be recorded in Nuendo, and thus incorporated into a regular MIDI recording.

Here's how it works: let's say you open up a filter while playing some notes. In that case, you will record both the notes and the SysEx messages generated when you opened the filter. When you play it back, the sound changes exactly like it did when you recorded it.

1. Open the Preferences dialog from the File menu, select the MIDI-MIDI Filter page and make sure that SysEx is recorded, i.e. the SysEx checkbox in the Record section is deactivated.

2. Make sure that the instrument is actually set to transmit changes of front panel controls as SysEx messages.

3. Record normally.

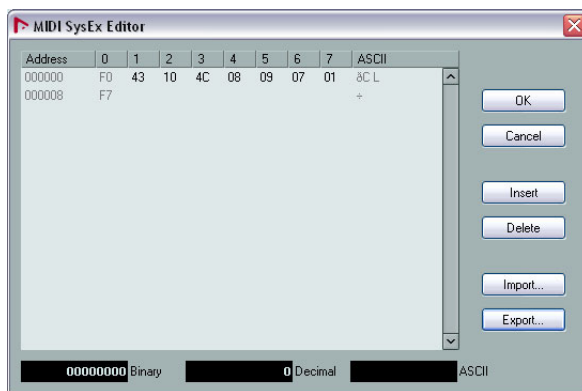
When you're done, you can check that the events were recorded properly in the List Editor.

Editing SysEx messages

While SysEx events are shown in the List Editor/Project Browser, their entire content is not (only the beginning of the message is displayed in the Comment column for the event). Also, you cannot edit the event (other than moving it) as you can with other event types in the List Editor.

Instead, you have to use the MIDI SysEx Editor for this.

- To open the MIDI SysEx Editor for an event, click in the Comments column for the event in the List Editor/Project Browser.



The display shows the entire message on one or several lines. SysEx messages always begin with F0 and end with F7 with a number of arbitrary bytes in between. If the message contains more bytes than fit on one line, it continues on the next. The Address indication to the left helps you find out on which position in the message a certain value resides.

You can edit all values except for the first (F0) and last one (F7).

Selecting and viewing values

To select a value, either click on it or use the cursor keys. The selected byte is displayed in various formats:

- In the main display, values are shown in hexadecimal format.
- To the right of this, values are shown in ASCII format.
- At the bottom of the dialog, the selected value is shown in ASCII, binary, and decimal formats.

Editing a value

The selected value can be edited directly in the main display or in the ASCII, decimal, and binary displays. Just click on it and type in the desired value as usual.

Adding and deleting bytes

Using the Insert and Delete buttons or their corresponding computer keyboard keys, you can add and delete bytes from the message. Inserted data will appear before the selection.

To delete the complete SysEx message, select it in the List Editor and press [Delete] or [Backspace].

Importing and exporting data

The Import and Export buttons allow you to get SysEx data from disk and to export the edited data to a file. The file has to be in "MIDI SysEx" (.SYX) binary format. Only the first dump in a SYX file will be loaded.

This format should not be confused with MIDI files, which have the extension .mid.

Introduction

Most of the time you will perform your MIDI editing graphically in one of the MIDI editors. But there are times when you want more of a “search and replace” function on MIDI data, and that’s where the Logical Editor comes in.

The principle of the Logical Editor is this:

- You set up *filter conditions* to find certain elements. This can be elements of a certain type, with certain attributes or values or on certain positions, in any combination. You can combine any number of filter conditions and make composite conditions using AND/OR operators.
- You select the basic *function* to be performed. The options include Transform (changing properties of the found elements), Delete (removing the elements), Insert (adding new elements based on the found positions of other elements) and more.
- You set up a list of *actions*, which specify exactly what is done.

This is not necessary for all functions. For example, the Delete function does not require any additional action specifications – it simply removes all found elements. The Transform function on the other hand requires that you specify which properties are changed and in which way (transpose notes by a certain amount, adjust velocity values, etc.).

By combining filter conditions, functions and the specific actions, you can perform very powerful processing.

To master the Logical Editor, you need some knowledge about how MIDI messages are structured. However, the Logical Editor also comes with a rich selection of presets, allowing you to access its processing powers without delving into its more complicated aspects, see “[Working with presets](#)” on [page 440](#).

⚠ Studying the included presets is an excellent way to learn the workings of the Logical Editor! Many of them can also be used as starting points when you set up your own editing operations using the Logical Editor.

About the Transformer MIDI effect

The Transformer effect is a realtime version of the Logical Editor, allowing you to apply editing to the events played back from a track “on the fly”. The Transformer contains virtually the same settings and functions as the Logical Editor – where there are differences between the two, this is clearly stated on the following pages.

⇒ For details on how to open the Transformer (and other MIDI effects), see “[MIDI realtime parameters and effects](#)” on [page 372](#).

About the Input Transformer

This too is very similar to the Logical Editor. Just like the Transformer effect, the Input Transformer works in realtime. However, the Input Transformer filters out and transforms MIDI data as it is recorded. In other words, the settings you make in the Input Transformer will affect the actual MIDI events you record.

The Input Transformer is described in the section “[The Input Transformer](#)” on [page 440](#). However, we recommend that you make yourself familiar with the Logical Editor first, since they share many features and principles.

About the Project Logical Editor

There is also a “Project Logical Editor” available via the Edit menu. This is described in the chapter “[The Project Logical Editor](#)” on [page 442](#).

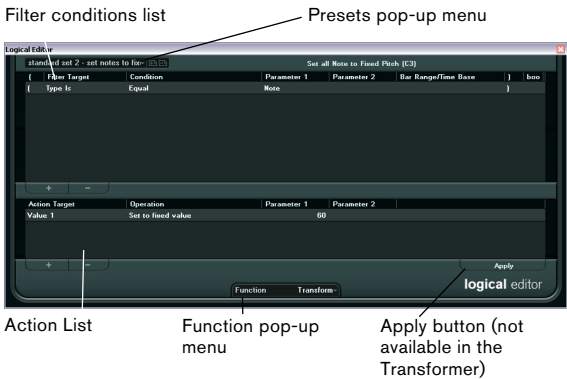
Opening the Logical Editor

1. Select the desired parts or events.
What will be affected by the operation depends on the current selection.
 - In the Project window, edits using the Logical Editor are applied to all selected parts, affecting all events (of the relevant types) in them.
 - In the MIDI editors, edits using the Logical Editor are applied to all selected events. If no events are selected, all events in the edited part(s) will be affected.

You can change the selection while the Logical Editor window is open.

2. Select “Logical Editor...” from the MIDI menu.

Window overview



Setting up filter conditions

General procedure

The upper list is where you set up the filter conditions, determining which elements to find. The list can contain one or several conditions, each on a separate line.

- To add a new condition, click the “+” button below the list.

A new line is added at the bottom of the list. If there are many lines, you may need to use the scrollbar to the right to view them.

- To remove a condition, select it and click the “-” button below the list.

⇒ If you have already defined filter conditions and/or applied a preset, but want to start again from scratch, you can initialize the settings by selecting the Init option from the Presets pop-up menu.

You set up a filter condition line by clicking in the columns and selecting options from the pop-up menus that appear. Here is a brief description of the columns:

Column	Description
Left bracket	This is used for “bracketing” several lines together when creating conditions with multiple lines and the boolean operators And/Or, see “ Combining multiple condition lines ” on page 436 .
Filter Target	Here you select which property to look for when finding elements. Your choice here affects the available options in the other columns as well, see below!

Column	Description
Condition	This determines how the Logical Editor compares the property in the Filter Target column to the values in the Parameter columns (see below). The available options depend on the Filter Target setting.
Parameter 1	Here you set which value the element properties are compared to (depending on the Filter Target). For example, if the Filter Target is “Position” and Condition is “Equal”, the Logical Editor will look for all elements starting at the position you specify in the Parameter 1 column.
Parameter 2	This column is only used if you have selected one of the “Range” options in the Condition column. This allows you to find all elements with values inside (or outside) the range between Parameter 1 and Parameter 2.
Bar Range/Time Base (Logical Editor only)	This column is only used if the Filter Target is set to “Position”. If one of the “Bar Range” options is selected in the Condition column, you use the Bar Range/Time Base column to specify “zones” within each bar (for example, allowing you to find all elements on or around the first beat of every bar). If any of the other Condition options is selected, you can use the Bar Range/Time Base column to specify the time base (PPQ, Seconds, etc.). See “ Searching for elements at certain positions (Logical Editor only) ” on page 434 for details.
Right bracket	This is used for “bracketing” several lines together, see “ Combining multiple condition lines ” on page 436 .
bool	This allows you to insert the boolean operators And/Or, when creating conditions with multiple lines, see “ Combining multiple condition lines ” on page 436 .

- You can also set up filter conditions by dragging MIDI events directly into the upper list.

If the list contains no entries, a MIDI event dragged into this section will form conditions including the state and type of the event. If it contains entries, the dragged event will initialize the matching parameters. For example, if a length condition is used, the length will be set according to the length of the event.

Conditions

Depending on the Filter Target setting, the following options can be selected in the Condition column:

Condition	Elements will be found if their Filter Target property...
Equal	...has the exact same value as set up in the Parameter 1 column.
Unequal	...has any value other than the one set up in the Parameter 1 column.
Bigger	...has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	...has a value that is the same as or higher than the one set up in the Parameter 1 column.

Condition	Elements will be found if their Filter Target property...
Less	...has a value lower than the one set up in the Parameter 1 column.
Less or Equal	...has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	...has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	...has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.
Inside Bar Range (Logical Editor only)	...is within the "zone" set up in the Bar Range/Time Base column (Position only), in each bar within the current selection.
Outside Bar Range (Logical Editor only)	...is outside the "zone" set up in the Bar Range/Time Base column (Position only), in each bar within the current selection.
Before Cursor (Logical Editor only)	...is before the song cursor position (Position only).
Beyond Cursor (Logical Editor only)	...is after the song cursor position (Position only).
Inside Track Loop (Logical Editor only)	...is inside the set track loop (Position only).
Inside Cycle (Logical Editor only)	...is inside the set cycle (Position only).
Exactly matching Cycle (Logical Editor only)	...exactly matches the set cycle (Position only).
Note is equal to	...is the note specified in the Parameter 1 column, regardless of octave (Pitch only). For example, lets you find all C notes, in all octaves.

⇒ The Conditions for the "Property" filter target are different, see ["Searching for properties"](#) on [page 436](#).

Below, the different Filter Targets (and their corresponding Condition and Parameter options) are described in more detail.

Searching for elements at certain positions (Logical Editor only)

Selecting "Position" in the Filter Target column lets you find elements starting at certain positions, either relative to the start of the song or within each bar.

- If you select any condition other than the Range or Bar Range options, you set up a specific position (in PPQ, seconds, samples, or frames) in the Parameter 1 column. Use the Bar Range/Time Base column to specify the time base.

Filter Target	Condition	Parameter 1
Position	Equal	1.01.01.000

Here, the Logical Editor will find all elements at 1.1.1. in the project.

- If you select Inside Range or Outside Range in the Condition column, you set the start position of the range in the Parameter 1 column and the end position in the Parameter 2 column. You can also change the time base using the Bar Range/Time Base column.

The Logical Editor will then find all elements inside or outside this position range.

- If you select one of the Bar Range options in the Condition column, the Bar Range/Time Base column will show a graphic bar display. You specify the range within the bar by clicking and dragging in the bar display (the specified Bar Range is indicated in blue).
- The Logical Editor will then find all elements starting inside or outside this Bar Range, in all bars (within the current selection).

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Position	Inside Bar Range	391	491	

Here, the Logical Editor will find elements starting around the second beat in each bar.

Searching for notes of certain lengths (Logical Editor only)

Only note events have lengths (actually, a note is made up of separate note-on and note-off events but in Nuendo it is considered as a single event with a length). Therefore, the "Length" Filter Target is only valid if you're specifically searching for notes – there has to be another condition line with the Filter Target "Type", Condition "Equal" and Parameter 1 set to "Note". See ["Combining multiple condition lines"](#) on [page 436](#) for details about using multiple filter conditions.

Searching for Value 1 or Value 2

A MIDI event is composed of several values. What is displayed for Value 1 and 2 depends on the type of event:

Event type	Value 1	Value 2
Notes	The Note Number/ Pitch.	The velocity of the note.
PolyPressure	The key that was pressed.	The amount of pressure for the key.
Controller	The type of Controller, displayed as a number.	The amount of Control Change.
Program Change	The Program Change number.	Not used.
Aftertouch	The amount of pressure.	Not used.
Pitchbend	The “fine tune” of the bend. Not always used.	The coarse amount of bend.

⇒ System Exclusive events are not included in the table above, since they do not use value 1 and 2.

Since value 1 and 2 have different meanings for different events, searching for value 2 = 64 would both find notes with the velocity 64 and controllers with the amount 64, etc. If this is not what you want, you can add an additional filter condition line with the Filter Target “Type”, specifying which type of events to find (see below).

⚠ This is particularly useful when searching for note pitch or velocity values, as described below.

The general procedures when searching for value 1 or 2 are:

- If you select any Condition other than the Range options, you set up a specific value in the Parameter 1 column.

Filter Target	Condition	Parameter 1	Parameter 2	But Range/Time Base
Value 2	Less	80		

Here, the Logical Editor will find all events with a value 2 less than 80.

- If you select Inside Range or Outside Range in the Condition column, the range consists of the values between Parameter 1 and Parameter 2.

Note that Parameter 1 should have the lower value.

Searching for note pitch or velocity

If you add another condition line with the Filter Target “Type”, Condition “Equal” and Parameter 1 set to “Note”, the Logical Editor will “know” you are searching for pitch or velocity. This has the following benefits:

- The Filter Targets Value 1 and Value 2 will be displayed as “Pitch” and “Velocity” respectively, making it easier to grasp the function of the filter condition.
- Pitch values in the Parameter columns will be displayed as note names (C3, D#4, etc.). When entering pitch values you can either type a note name or a MIDI note number (0–127).
- When Value 1 (pitch) is selected as Filter Target, an additional option appears in the Condition column: “Note is equal to”. When this is selected, you specify a note name in the Parameter 1 column but without any octave number (C, C#, D, D#, etc.). The Logical Editor can then find all notes of a certain key, in all octaves.

See “Combining multiple condition lines” on [page 436](#) for more info on working with multiple filter condition lines.

Searching for controllers

There is similar extended functionality when searching for controllers: If you have added an additional “Type = Controller” condition line, the Logical Editor will “know” you are searching for controllers. The Parameter 1 column will then show the names of the MIDI controllers (Modulation, Volume, etc.) when Value 1 is selected as Filter Target.

Searching for MIDI channels

Each MIDI event contains a MIDI channel setting (1–16). Normally, these settings are not used, since the MIDI event plays back on the MIDI channel set for its track. However, you can come across MIDI parts with events set to different channels, for example in the following scenarios:

- If you have recorded MIDI from an instrument sending on several different channels (e.g. a master keyboard with different key zones).
- If you have imported a MIDI file of type 0 (with a single track, containing MIDI events with different channel settings).

Searching for MIDI channel values is straightforward; you select a Condition and enter a MIDI channel (1–16) in the Parameter 1 column (and, if you have selected one of the Range Conditions, a higher channel in the Parameter 2 column, creating a value range).

Searching for element types

Selecting Type as the Filter Target allows you to find elements of a certain type only.

- The Condition column contains only three options: Equal, Unequal and All Types.
- Clicking the Parameter 1 column displays a pop-up menu, listing the available types (Note, Poly Pressure, Controller, etc.).

The Logical Editor will find all elements matching or not matching the selected type (depending on the Condition).

⚠ As mentioned above, selecting Type = Note or Type = Controller adds some additional functionality to the Logical Editor. You should make it a habit to add a Type condition when applicable.

Searching for properties

On the Filter Target pop-up menu, you will find an option called Property. This allows you to search for properties that are not part of the MIDI standard but rather Nuendo-specific settings.

When the Property option is selected, the Condition column has two options: “Property is set” and “Property is not set”. Which property to look for is selected in the Parameter 1 column. The options are “muted”, “selected” and “empty”. Two examples:

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Property	Property is set	Event is muted		

Here, the Logical Editor will find all muted events.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Property	Property is set	Event is selected		
Property	Not set	Event is muted		

Here, the Logical Editor will find all events that are selected and muted.

Searching for event contexts

On the Filter Target pop-up menu, you will find an option called “Last Event”. This can be used to perform context-dependent searches (especially useful in the Input Transformer).

“Last Event” indicates the state of an event which has already passed the Input Transformer/Logical Editor. The condition has to be combined with Parameter 1 and Parameter 2.

Below, you will find a few examples on how the Last Event filter target can be used.

Here, the action will only be performed when the sustain pedal is down:

Filter Target	Condition	Parameter 1	Parameter 2
Last Event	Equal	MIDI Status	176/Controller
Last Event	Equal	Value 1	64
Last Event	Bigger	Value 2	64

In this example, the action will be performed when the note C1 is pressed (the “Note is playing” condition is only available in the Input Transformer and in the Transformer effect):

Filter Target	Condition	Parameter 1	Parameter 2
Type is	Equal	Note	
Last Event	Equal	Note is playing	36/C1

In this example, the action will be performed after playing the C1 note:

Filter Target	Condition	Parameter 1	Parameter 2
Last Event	Equal	Value 1	36/C1

Combining multiple condition lines

As described above, you can add condition lines by clicking the “+” button below the list. The result of combining condition lines depends on the boolean And/Or operators and the brackets.

The bool column

By clicking in the “bool” column to the right in the list, you can select a boolean operator: “And” or “Or”. A boolean operator combines two condition lines and determines the result in the following way:

- If two condition lines are combined with a boolean And, both conditions must be fulfilled for an element to be found.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Type is	Equal	Note			
Position	Equal	3.01.01.000	PPQ		

The Logical Editor will only find elements that are notes and start at the beginning of the third bar.

- If two condition lines are combined with a boolean Or, one of the conditions (or both) must be fulfilled for an element to be found.

(	Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
(	Type Is	Equal	Note				Or
	Position	Equal	3 01.01.000	PPQ)	

The Logical Editor will find all events that are notes (regardless of their position) and all events starting at the beginning of the third bar (regardless of their type).

When you add a new condition line, the boolean setting defaults to And. Therefore, if all you want to do is set up two or more conditions that all must be met for an element to be found, you do not have to think about the boolean column – just add the required lines and make the usual filter settings.

Using brackets

The bracket (parenthesis) columns let you enclose two or more condition lines, dividing the conditional expression into smaller units. This is only relevant when you have three or more condition lines and want to use the boolean Or operator. This is how it works:

- Without brackets, the conditional expressions are evaluated according to their order in the list.

(	Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
(	Type Is	Equal	Note				And
	Pitch	Equal	C3				Or
	Channel	Equal	1)	

In this case the Logical Editor will find all MIDI notes with the pitch C3, as well as all events (regardless of their type) set to MIDI channel 1.

Maybe you wanted to find all notes that either had the pitch C3 or the MIDI channel 1 (but no non-note events)? Then you need to add some brackets:

(	Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
(	Type Is	Equal	Note				And
	Pitch	Equal	C3				Or
	Channel	Equal	1)	

- Expressions within brackets are evaluated first. If there are several layers of brackets, these are evaluated “from the inside out”, starting with the innermost brackets.

You add brackets by clicking in the bracket columns and selecting an option. Up to triple brackets can be selected.

Selecting a function



The pop-up menu at the bottom of the Logical Editor is where you select the function – the basic type of editing to be performed.

Below, the available options are listed. Note that some options are not available in the Transformer effect.

Delete

Deletes all elements found by the Logical Editor. In the case of the Transformer, this function will remove (or “mute”) all found elements from the “output stream” – the actual elements on the track are not affected.

Transform

Changes one or several aspects of the found elements. You set up exactly what is changed in the action list, see “Specifying actions” on [page 438](#).

Insert

This will create new elements and insert these into the part(s) (Logical Editor) or the output stream (Transformer). The new elements will be based on the elements found by the Logical Editor’s filter conditions, but with any changes you have set up in the action list applied.

Another way of expressing this is that the Insert function copies the found elements, transforms them according to the action list and inserts the transformed copies among the existing elements.

Insert Exclusive

This will transform the found elements according to the action list. Then, all elements that were not found (that did not meet the filter conditions) are deleted (Logical Editor) or removed from the output stream (Transformer).

Copy (Logical Editor only)

This will copy all found elements, transform them according to the action list and paste them into a new part on a new MIDI track. The original events are not affected.

Extract (Logical Editor only)

This works like Copy, but will cut the found events instead. Or in other words, Extract will transform all found events and move them to a new part on a new MIDI track.

Select (Logical Editor only)

This will simply select all found events, highlighting them for further work in the regular MIDI editors.

Specifying actions

Action Target	Operation	Parameter 1	Parameter 2
Value 1	Set to fixed value		2

The lower list in the Logical Editor window is the action list. This is where you specify any changes that are made to the found events (relevant for all function types except Delete and Select).

The handling of the action list is similar to the filter condition list, but without the brackets and booleans. You simply add lines by clicking the “+” button below the list, and fill out the columns as required. To remove a superfluous action line, select it and click the “-” button.

Action Target

This is where you select the property that is changed in the events:

Option	Description
Position (Logical Editor only)	Adjusting this value will move the events.
Length (Logical Editor only)	Lets you resize the events (notes only).
Value 1	This adjusts value 1 in the events. As described in the section “ Searching for Value 1 or Value 2 ” on page 435 , what is displayed for value 1 depends on the event type. For notes, value 1 is the pitch.
Value 2	This adjusts value 2 in the events. As described in the section “ Searching for Value 1 or Value 2 ” on page 435 , what is displayed for value 2 depends on the event type. For notes, value 2 is the velocity value.

Option	Description
Channel	Allows you to change the MIDI channel setting, see “ Searching for MIDI channels ” on page 435 .
Type	Allows you to change the event type, e.g. transform after-touch events to modulation events.
Value 3	This adjusts value 3 in the events, which is used for handling of Note-off velocity when searching for properties, see “ Searching for properties ” on page 436 .

⇒ The Position and Length parameters are interpreted via the time base setting in the Bar Range/Time Base column, with the exception of the Random setting, which uses the time base of the affected events.

Operation

This setting determines what to do with the Action Target. The options on this pop-up menu are different depending on the selected Action Target. Below, all available operations are listed:

Add

Adds the value specified in the Parameter 1 column to the Action Target.

Subtract

Subtracts the value specified in the Parameter 1 column from the Action Target.

Multiply by

Multiplies the Action Target value with the value specified in the Parameter 1 column.

Divide by

Divides the Action Target value by the value specified in the Parameter 1 column.

Round by

This “rounds” the Action Target value using the value specified in the Parameter 1 column. In other words, the Action Target value is changed to the closest value that can be divided by the Parameter 1 value.

For example, if the Action Target value is 17 and Parameter 1 is 5, the result of rounding will be 15 (the closest value that can be divided by 5). Another word for this type of operation would be “quantizing”, and it is actually possible to use it for this, by setting the Action Target to “Position” and specifying a quantize value with Parameter 1 (in ticks, with 480 ticks per quarter note).

Set Random Values between

This will set the Action Target value to a random value within the range specified with Parameter 1 and 2.

Set Relative Random Values between

This will add a random value to the current Action Target value. The added random value will be within the range specified with Parameter 1 and 2. Note that these can be set to negative values.

For example, if you set Parameter 1 to -20 and Parameter 2 to +20, the original Action Target value will get a random variation, never exceeding ± 20 .

Set to fixed value

This sets the Action Target to the value specified in the Parameter 1 column.

Add Length (Logical Editor only)

This is only available when Action Target is set to Position. Furthermore, it is only valid if the found events are notes (and thus have a length). When Add Length is selected, the length of each note event will be added to the Position value. This can be used for creating new events (using the Insert function) positioned relative to the end positions of the original notes.

Transpose to Scale

This is only available when Action Target is set to Value 1, and when the filter conditions are specifically set up to find notes (a “Type = Note” filter condition line has been added). When “Transpose to Scale” is selected, you can specify a musical scale using the Parameter 1 and 2 columns. Parameter 1 is the key (C, C#, D, etc.) while Parameter 2 is the type of scale (major, melodic or harmonic minor, etc.).

Each note will be transposed to the closest note in the selected scale.

Use Value 2

This is only available when Action Target is set to Value 1. If this option is selected, the Value 2 setting in each event will be copied to the Value 1 setting.

This is useful, for example, if you are transforming all Modulation controllers to Aftertouch events (since controllers use Value 2 for their amount, while Aftertouch uses Value 1 – see [“Searching for Value 1 or Value 2”](#) on [page 435](#)).

Use Value 1

This is only available when Action Target is set to Value 2. If this option is selected, the Value 1 setting in each event will be copied to the Value 2 setting.

Mirror

This is only available when Action Target is set to Value 1 or Value 2. When this option is selected, the values will be “mirrored” around the value set in the Parameter 1 column.

In the case of notes, this will invert the scale, with the key set in the Parameter 1 column as “center point”.

Linear Change in Loop Range (Logical Editor only)

This will affect events within the loop range (between the left and right locators) only. It will create a linear “ramp” of values (replacing the original values) starting at the value in the Parameter 1 column and ending at the Parameter 2 value.

This can be used for creating linear controller sweeps, velocity ramps, etc.

Relative Change in Loop Range (Logical Editor only)

As with the previous option, this will create a ramp of values, affecting events in the loop range only (i.e. between the locators). However, here the changes are “relative”, meaning that values will be added to the existing values.

In other words, you set up a value ramp starting at Parameter 1 and ending at Parameter 2 (note that the Parameter values can be negative). The resulting value ramp is then added to the existing values for the events within the loop range.

For example, if you apply this to note velocities with Parameter 1 set to 0 and Parameter 2 set to -100, you create a velocity fade-out, keeping the original velocity relations:



Applying the defined actions

Once you have set up filter conditions, selected a function and set the required actions (or loaded a preset), you apply the actions defined with the Logical Editor by clicking the Apply button.



In the Logical Editor, processing is not performed until you click the Apply button. When using the Transformer MIDI effect, there is no Apply button – the current settings are automatically applied in realtime during playback or live playing.

Logical Editor operations can be undone just like any other editing.

Working with presets

The Presets pop-up menu at the top of the window allows you to load, store, and manage Logical Editor presets.

- To load a preset, select it from the Presets pop-up menu. If available, an explanatory text appears to the right of the menu. When setting up your own presets, you can click in this area and enter a description.
- You can also select Logical Presets directly from the MIDI menu.

This allows you to apply a preset to the selected MIDI part, without having to open the Logical Editor.

- It is also possible to select and apply Logical Presets from within the List Editor (from the Mask menu).

Storing your own settings as a preset

If you have made Logical Editor settings that you want to use again, you can store them as a preset:

1. Click on the Store Preset button on the right of the Preset menu.

A dialog for specifying a name for the new preset is displayed.

2. Enter a name for the preset and click OK.

The preset is stored.

⇒ To remove a preset, load it and click on the Remove Preset button.

Organizing and sharing presets

The Logical Editor presets are stored within the application folder in the Presets\Logical Edit subfolder. While these files cannot be edited “manually”, you can reorganize them (e.g. putting them in subfolders) like any files.

This also makes it easy to share presets with other Nuendo users, by transferring the individual preset files.

⇒ The list of presets is read each time the Logical Editor is opened.

The Input Transformer

This function allows you to filter out and change MIDI data coming to a MIDI track before it is recorded. The Input Transformer is very similar to the Transformer MIDI effect, but contains four independent “modules”, for which you can set up different filtering and actions. You can activate any or all of these four modules.

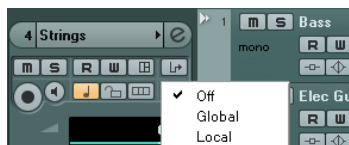
Here are some of the things the Input Transformer allows you to do:

- Set up split keyboard combinations for recording left and right hands separately.
- Turn a controller like a foot pedal into MIDI notes (for playing bass drum the right way).
- Filter out one specific type of MIDI data on one MIDI channel only.
- Turn aftertouch into any controller (and vice versa).
- Invert velocity or pitch.

Again: four of these things can be done at the same time.

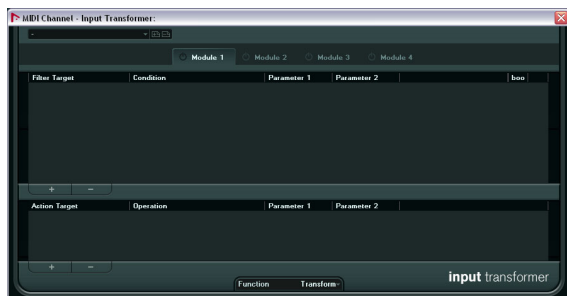
Opening the Input Transformer

To open the Input Transformer for a MIDI track, select the track and click the Input Transformer button in the Inspector to open the pop-up menu.



- Select Global to make Input Transformer settings that affect all MIDI inputs (and thereby all MIDI tracks).
- Select Local to make Input Transformer settings for this track only.

In both cases, the button lights up and the Input Transformer opens.



Handling the four modules

The Input Transformer is really four separate transformers, or modules.

- You select which module to view and make settings for by clicking the corresponding Module tab.



Module 1 selected for viewing and editing.

- The On/Off buttons next to the Module names determine which module(s) are active.



Here, Module 1 is inactive and Module 2 is active.

The Function pop-up menu

The Function pop-up menu contains two options: Filter and Transform.

- In Filter mode, only the filter conditions (the upper list) are taken into account. All events matching the conditions set up will be filtered out (excluded from the recording).
- In Transform mode, events matching the filter conditions will be transformed according to the settings in the action list (the lower list).

Setting up filtering and actions

This is done just like in the Logical Editor. Here is a brief rundown:

- Click the “+” button to add lines to the filter condition list or action list.
- To remove a line, click it to select it and click the “-” button below the lists.
- Clicking the columns in the filter condition list opens pop-up menus allowing you to specify the conditions to match.
- Clicking the columns in the action list opens pop-up menus allowing you to specify how the found events are transformed (when Transform mode is selected).

For detailed descriptions of the filter conditions and action columns, see [“General procedure”](#) on [page 433](#).

- The Input Transformer has no Apply button – the settings are active as soon as you activate the On/Off button of a module.
- The settings made in the active modules will affect all MIDI data you record on the track.

⇒ Closing the Input Transformer window does *not* turn it off – you need to deactivate the On/Off buttons of all modules for this!

A lit Input Transformer button in the Inspector indicates that one or more modules are active.



Introduction

On the Edit menu you will find the function “Project Logical Editor...”. This opens a Project Logical Editor for the entire project. It works similar to the Logical Editor on the MIDI menu, see the chapter [“The Logical Editor, Transformer, and Input Transformer”](#) on [page 431](#). The most important difference is that the Logical Editor for MIDI works at the event level, whereas the Project Logical Editor works at the project level and is therefore a very powerful tool for “search and replace” functions in your entire project.

⇒ The MIDI events in the MIDI parts will not be affected by the Project Logical Editor operations. If you want to change MIDI notes or controller data, you have to use the Logical Editor.

With the Project Logical Editor, you can combine filter conditions with actions to create complex procedures, e.g. for special track type operations on tracks that are named identically. You can use its functions to delete all muted MIDI parts or to toggle the open state of all folder tracks in your project, etc.

Included with the Project Logical Editor are a number of presets that give you an impression of the great possibilities that this feature offers, see [“Working with presets”](#) on [page 450](#). Many of them can also be used as starting points when you set up your own editing operations.

The principle for the Project Logical Editor is this:

- You set up *filter conditions* to find certain elements. This can be elements of a certain type, with certain attributes or values or on certain positions, in any combination. You can combine any number of filter conditions and make composite conditions using AND/OR operators.
- You select the basic *function* to be performed. The options are Transform (changing properties of the found elements), Delete (removing the elements) and Select (selecting the found elements).
- You set up a list of *actions*, which specify exactly what is done. This is not necessary for all functions. For example, the Delete function does not require any additional action specifications – it simply removes all found elements.
- In the Macro pop-up menu you can choose an additional *macro* that will be executed after the actions you defined. Use this to extend the possibilities offered by combining the filter conditions and actions specified in the Project Logical Editor even further.

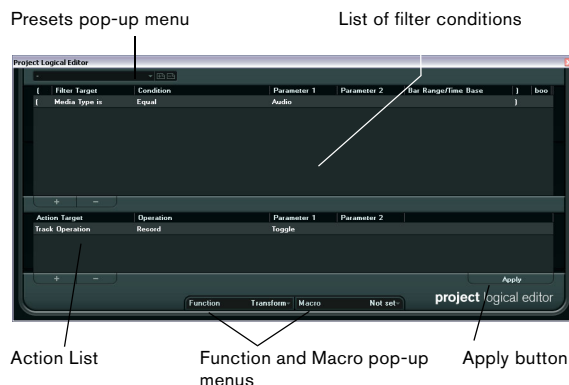
By combining filter conditions, functions, the specific actions, and additional macros, you can perform very powerful processing.

⚠ The Project Logical Editor allows all kinds of settings that may not always make sense. Experiment a bit before applying your edits to important projects. You can undo the operations by using the Undo command on the Edit menu.

Opening the Project Logical Editor

1. Open the desired project.
All elements in the project will be affected, you do not have to make any selection.
2. Select “Project Logical Editor...” from the Edit menu.

Window overview



To understand the Project Logical Editor, it might be a good idea to start by exploring the included presets. These are found on the Presets pop-up menu at the top of the window. For information on how to create and handle your own presets, see [“Working with presets”](#) on [page 450](#).

Setting up filter conditions

General procedure

The upper list is where you set up the filter conditions, determining which elements to find. The list contains one or several conditions, each on a separate line.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Media Type is	Equal	MIDI		
Container Type is	Equal	Track		

- To add a new condition, click the “+” button below the list.

The new line is added at the bottom of the list. If there are many lines, you may need to use the scrollbar to the right to view them.

- To remove a condition, select it and click the Delete button (-) below the list.

⇒ If you have already defined filter conditions and/or applied a preset, but want to start again from scratch, you can initialize the settings by selecting the Init option from the Presets pop-up menu.

You set up a filter condition line by clicking in the columns and selecting options from the pop-up menus that appear. Here is a brief description of the columns:

Column	Description
Left bracket	This is used for “bracketing” several lines together when creating conditions with multiple lines and the boolean operators And/Or, see “Combining multiple condition lines” on page 447 .
Filter Target	Here you select which property to look for when finding elements. Your choice here affects the available options in the other columns as well, see below!
Condition	This determines how the Project Logical Editor compares the property in the Filter Target column to the values in the Parameter columns. The available options depend on the Filter Target setting.
Parameter 1	Here you set which value the element properties are compared to (depending on the Filter Target). For example, if the Filter Target is “Position” and Condition is “Equal”, the Project Logical Editor will look for all elements starting at the position you specify in the Parameter 1 column.
Parameter 2	This column is only used if you have selected one of the “Range” options in the Condition column. Typically, this allows you to find all elements with values inside (or outside) the range between Parameter 1 and Parameter 2.

Column	Description
Bar Range/Time Base	This column is only used if the Filter Target is set to “Position”. If one of the “Bar Range” options is selected in the Condition column, you use the Bar Range/Time Base column to specify “zones” within each bar (allowing you to find all elements on or around the first beat of every bar, for example). If any of the other Condition options is selected, you can use the Bar Range/Time Base column to specify the time base (PPQ, Seconds, etc.). See “Searching for elements at certain positions” on page 446 for details.
Right bracket	This is used for “bracketing” several lines together, see “Combining multiple condition lines” on page 447 .
bool	This allows you to insert the boolean operators And/Or, when creating conditions with multiple lines, see “Combining multiple condition lines” on page 447 .

Below, the different Filter Targets (and their corresponding Condition and Parameter options) are described in more detail.

Searching for Media types

1. Select “Media Type” in the Filter Target pop-up menu. This allows you to find elements of certain types of media only.

2. Open the pop-up menu in the Parameter 1 column and select the desired option.

When the Filter Target is set to Media Type, the pop-up menu lists the available media types. The following table lists what will be found:

Media Type	Description
Audio	If no container type is specified, this finds audio events, audio parts and audio tracks.
MIDI	If no container type is specified, this finds MIDI parts and MIDI tracks.
Automation	If no container type is specified, this finds automation events and automation tracks.
Marker	If no container type is specified, this finds marker events and marker tracks.
Transpose	If no container type is specified, this finds transpose events and transpose tracks.
Arranger	If no container type is specified, this finds arranger events and arranger tracks.
Tempo	If no container type is specified, this finds tempo events and tempo tracks.
Signature	If no container type is specified, this finds signature events and signature tracks.

3. Open the pop-up menu in the Condition column and select the desired condition.

For media types, the following options are available:

Condition	Description
Equal	This finds the Media Type set up in the Parameter 1 column.
All Types	This finds all Media Types.

For example, if you have set up the Project Logical Editor like this...

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Media Type is	Equal	Marker		

...it will find all marker events and tracks in the project.

Searching for Container types

1. Select Container Type in the Filter Target pop-up menu. This allows you to find parts, events or tracks.

2. Open the pop-up menu in the Parameter 1 column and select the desired option.

When the Filter Target is set to Container Type, the pop-up menu lists the available container types. The following table lists what will be found:

Container Type	Description
Folder Track	This finds all folder tracks, included FX Channel and Group Channel folders.
Track	This finds all track types.
Part	This finds audio, MIDI, and instrument parts. Folder parts will not be found.
Event	This finds automation points, markers, as well as audio, arranger, transpose, tempo and time signature events.

3. Open the pop-up menu in the Condition column and select the desired condition.

For container types, the following options are available:

Condition	Description
Equal	This finds the Container Type set up in the Parameter 1 column.
All Types	This finds all Container Types.

For example, if you have set up the Project Logical Editor like this...

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Container Type is	Equal	FolderTrack		

...it will find all Folder tracks in the project.

Combining Media Type and Container Type

The combination of the filter targets Media Type and Container Type represents a versatile tool for logical operations:

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	
Media Type is	Equal	MIDI			And
Container Type is	Equal	Part)

Here, the Project Logical Editor will find all MIDI and instrument parts in the project.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	
Media Type is	Equal	Automation			And
Container Type is	Equal	Track			And
Name	Contains	vol)

Here, the Project Logical Editor will find all automation tracks (not events) in the project whose name contains vol.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	
Media Type is	Equal	MIDI			And
Container Type is	Equal	Part			And
Property	Not set	Event is muted)

Here, the Project Logical Editor will find all MIDI and instrument parts (not tracks) in the project that are muted.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	
Media Type is	Equal	MIDI			And
Container Type is	Equal	Part			Or
Media Type is	Equal	Audio			And
Container Type is	Equal	Event			And
Property	Property is not set	Event is muted)

Here, the Project Logical Editor will find all MIDI and instrument parts (not tracks) or all audio events (not parts or tracks) in the project that are muted.

Searching for Names

1. Select Name on the Filter Target pop-up menu.

2. Enter the desired name, or a part of a name in the Parameter 1 column.

3. Open the pop-up menu in the Condition column and select the desired condition.

For names, the following options are available:

Condition	Description
Equal	This is the exact same text string as set up in the Parameter 1 column.
Contains	This contains the text specified in the Parameter 1 column.

For example, if you have set up the Project Logical Editor like this...

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	
Container Type is	Equal	Track			And
Name	Contains	voc)

...it will find all tracks in the project whose name contains "voc".

⇒ To take maximum advantage of this feature, we recommend using a standard nomenclature in your projects (Drums, Perc, Voc, etc.).

Searching for elements at certain positions

1. Select “Position” in the Filter Target pop-up menu. This allows you to find elements starting at certain positions, either relative to the start of the project or within each bar.

2. Open the pop-up menu in the Condition column and select the desired condition.

For positions, the following options are available:

Condition	An element will be found if it...
Equal	...has the exact same value as set up in the Parameter 1 column.
Unequal	...has any value other than the one set up in the Parameter 1 column.
Bigger	...has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	...has a value that is the same as or higher than the one set up in the Parameter 1 column.
Less	...has a value lower than the one set up in the Parameter 1 column.
Less or Equal	...has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	...has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	...has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.
Inside Bar Range	...is within the “zone” set up in the Bar Range/Time Base column, in each bar within the current selection.
Outside Bar Range	...is outside the “zone” set up in the Bar Range/Time Base column, in each bar within the current selection.
Before Cursor	...is before the song Project position.
Beyond Cursor	...is after the song Project position.
Inside Track Loop	...is inside the set track loop (see “The independent track loop function” on page 317).
Inside Cycle	...is inside the set cycle.
Exactly matching Cycle	...exactly matches the set cycle.

▪ If you select any condition other than the Range, Bar Range, Cursor, Loop or Cycle options, you set up a specific position (in PPQ, seconds, samples, or frames) in the Parameter 1 column. Use the Bar Range/Time Base column to specify the time base. Note that the position for Bar Range is measured in ticks related to the start of the bar.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Position	Equal	1,01,01,000		PPQ

Here, the Project Logical Editor will find all elements at the PPQ position 5.1.1. in the project.

▪ If you select Inside Range or Outside Range in the Condition column, you set the start position of the range in the Parameter 1 column and the end position in the Parameter 2 column. You can also change the time base using the Bar Range/Time Base column.

The Project Logical Editor will then find all elements inside or outside this position range.

▪ If you select one of the Bar Range options in the Condition column, the Bar Range/Time Base column will show a graphic bar display. You specify the range within the bar by clicking and dragging in the bar display (the specified Bar Range is indicated in blue).

The Project Logical Editor will then find all elements starting inside or outside this Bar Range, in all bars (within the current selection).

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base
Position	Inside Bar Range	419	541	

Here, the Project Logical Editor will find elements starting around the second beat in each bar.

Searching for elements of certain lengths

1. Select Length in the Filter Target pop-up menu. This allows you to find elements of a certain length only. The Length parameter is interpreted via the time base setting in the Bar Range/Time Base column, i.e. in PPQ, seconds, samples, or frames.

2. Open the pop-up menu in the Condition column and select the desired condition.

For lengths, the following options are available:

Condition	An element will be found, if it...
Equal	...has the exact same value as set up in the Parameter 1 column.
Unequal	...has any value other than the one set up in the Parameter 1 column.
Bigger	...has a value higher than the one set up in the Parameter 1 column.
Bigger or Equal	...has a value that is the same as or higher than the one set up in the Parameter 1 column.

Condition	An element will be found, if it...
Less	...has a value lower than the one set up in the Parameter 1 column.
Less or Equal	...has a value that is the same as or lower than the one set up in the Parameter 1 column.
Inside Range	...has a value that is between the values set up in the Parameter 1 and Parameter 2 columns. Note that Parameter 1 should be the lower value and Parameter 2 the higher.
Outside Range	...has a value that is not between the values set up in the Parameter 1 and Parameter 2 columns.

If you select any condition other than the Range options, you set up a specific position in the Parameter 1 column.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Media Type is	Equal	Part			And
Container Type is	Equal	Event			And
Media Type is	Equal	Audio			And
Length	Less	0200	Samples		

Here, the Project Logical Editor will find all audio parts and events in the project with a length smaller than 200 samples.

Searching for properties

1. Select “Property” on the Filter Target pop-up menu.
2. Open the pop-up menu in the Condition column and select the desired condition.
When the Property option is selected, the Condition column has two options: “Property is set”, and “Property is not set”.
3. Open the pop-up menu in the Parameter 1 column and select the desired option.
This sets which property will be searched. The options are “Event is muted”, “Event is selected”, and “Event is Empty”.

⇒ Note that “event” in this context refers to all the Project window elements that can be modified, e.g. MIDI parts, audio events and parts, or transpose, arranger, and automation events.

Three examples:

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Media Type is	Equal	MIDI			And
Container Type is	Equal	Part			And
Property	Property is set	Event is muted			

Here, the Project Logical Editor will find all muted MIDI and instrument parts.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Property	Property is set	Event is selected			And
Property	Property is not set	Event is muted			

Here, the Project Logical Editor will find all elements that are selected but not muted.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Media Type is	Equal	Audio			And
Container Type is	Equal	Part			And
Property	Property is set	Event is selected			And
Property	Property is set	Event is empty			

Here, the Project Logical Editor will find all selected audio parts that are empty.

Combining multiple condition lines

As described above, you can add condition lines by clicking the “+” button below the list. The result of combining condition lines depends on the boolean And/Or operators and the brackets.

The bool column

By clicking in the “bool” column to the right in the list, you can select a boolean operator: “And” or “Or”. A boolean operator combines two condition lines and determines the result in the following way:

- If two condition lines are combined with a boolean And, both conditions must be fulfilled for an element to be found.


Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	bool
Media Type is	Equal	MIDI			And
Container Type is	Equal	Track			

The Project Logical Editor will only find MIDI tracks.

- If two condition lines are combined with a boolean Or, one of the conditions (or both) must be fulfilled for an element to be found.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
Container Type is	Equal	Part				Or
Container Type is	Equal	Event				And
Position	Exactly Matching Cycle			PPQ		

The Project Logical Editor will find all parts or events that match exactly the cycle.

 When you add a new condition line, the boolean setting defaults to And. Therefore, if all you want to do is set up two or more conditions that all must be met for an element to be found, you do not have to think about the boolean column – just add the required lines and make the usual filter settings.

Using brackets

The bracket (parenthesis) columns let you enclose two or more condition lines, dividing the conditional expression into smaller units. This is only relevant when you have three or more condition lines and want to use the boolean Or operator.

You add brackets by clicking in the bracket columns and selecting an option. Up to triple brackets can be selected.

- Without brackets, the conditional expressions are evaluated according to their order in the list.

Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
Media Type is	Equal	Audio				And
Name	Contains	perc				Or
Name	Contains	drums				

Here, the Project Logical Editor will find all audio parts and events whose name contains perc as well as other parts and events (e.g. MIDI parts) whose name contains drums.

Maybe you want to find all audio parts and events that either had the name perc or the name drums (but no other parts or events named drums)? Then you need to add some brackets:

(	Filter Target	Condition	Parameter 1	Parameter 2	Bar Range/Time Base	)	boo
(	Media Type is	Equal	Audio				And
(	Name	Contains	perc				Or
	Name	Contains	drums)	

Here, all audio parts or events will be found whose name contains perc or drums.

⇒ Expressions within brackets are evaluated first.

If there are several layers of brackets, these are evaluated “from the inside out”, starting with the innermost brackets.

Specifying actions

Action Target	Operation	Parameter 1	Parameter 2
Track Operation	Record	Toggle	

The lower list in the Project Logical Editor window is the action list. This is where you specify any changes that are made to the found elements, relevant for the function type Transform.

You can perform two different kinds of actions: track-based actions (such as Track Operation, Name) and event-based actions (such as Position, Length, Name). There are also actions that only take effect on automation data (Trim).

The handling of the action list is similar to the filter condition list, but without the brackets and booleans. You simply add lines by clicking the “+” button, and fill out the columns as required. To remove a superfluous action line, select it and click the “-” button.

Action Target

This is where you select the property that is changed. The Operations determine what to do with the Action Target. Below, all available operations are listed:

Position

Adjusting this value will move the elements. This parameter is interpreted via the time base setting in the Bar Range/Time Base column, with the exception of the Random setting, which uses the time base of the affected events:

Operation	Description
Add	Adds the value specified in the Parameter 1 column to the Position.
Subtract	Subtracts the value specified in the Parameter 1 column from the Position.
Multiply by	Multiplies the Position value with the value specified in the Parameter 1 column.
Divide by	Divides the Position value by the value specified in the Parameter 1 column.
Round by	This “rounds” the Position value using the value specified in the Parameter 1 column. In other words, the Position value is changed to the closest value that can be divided by the Parameter 1 value. For example, if the Position value is 17 and Parameter 1 is 5, the result of rounding will be 15 (the closest value that can be divided by 5). Another word for this type of operation would be “quantizing”, and it is actually possible to use it for this, by specifying a quantize value with Parameter 1 (in ticks, with 480 ticks per quarter note).

Operation	Description
Set Relative Random Values between	This will add a random value to the current Position value. The added random value will be within the range specified with Parameter 1 and 2. Note that these can be set to negative values. For example, if you set Parameter 1 to -20 and Parameter 2 to +20, the original Position value will get a random variation, never exceeding ± 20 .
Set to fixed value	This sets the Position to the value specified in the Parameter 1 column.

Length

Lets you resize the elements. This parameter is interpreted via the time base setting in the Bar Range/Time Base column, with the exception of the Random setting, which uses the time base of the affected events:

Operation	Description
Add	Adds the value specified in the Parameter 1 column to the Length.
Subtract	Subtracts the value specified in the Parameter 1 column from the Length.
Multiply by	Multiplies the Length value with the value specified in the Parameter 1 column.
Divide by	Divides the Length value by the value specified in the Parameter 1 column.
Round by	This "rounds" the Length value using the value specified in the Parameter 1 column. In other words, the Length value is changed to the closest value that can be divided by the Parameter 1 value.
Set to fixed value	This sets the Length to the value specified in the Parameter 1 column.
Set Random Values between	This will add a random value to the current length. The added random value will be within the range specified with Parameter 1 and 2.

Track Operation

This lets you change the track status.

Operation	Description
Folder	Opens, closes or toggles folders.
Record	Enables, disables or toggles the record enable status.
Monitor	Enables, disables or toggles the monitor status.
Solo	Enables, disables or toggles the solo status.
Mute	Enables, disables or toggles the mute status.
Read	Enables, disables or toggles the read enable status.
Write	Enables, disables or toggles the write enable status.
EQ Bypass	Enables, disables or toggles the EQ bypass status.
Inserts Bypass	Enables, disables or toggles the inserts bypass status.

Operation	Description
Sends Bypass	Enables, disables or toggles the sends bypass status.
Lanes Active	Enables, disables or toggles the lanes active status.

Name

This lets you rename the found elements.

Operation	Description
Replace	Replaces names with the text specified in the Parameter 1 column.
Append	Names will be appended with the string specified in the Parameter 1 column.
Prepend	The name will be prepended with the string specified in the Parameter 1 column.
Generate Name	The name will be replaced by the text specified in the Parameter 1 column, followed by the number set with Parameter 2. The number will be increased by 1 for every found element.
Replace Search String	You can specify a search string under Parameter 1 that is replaced by the text specified in the Parameter 2 column.

Trim

This Action Target is used for automation only and lets you trim the found elements.

Operation	Description
Multiply by	Multiplies the Trim value with the value specified in the Parameter 1 column.
Divide by	Divides the Trim value by the value specified in the Parameter 1 column.

Set Color

This lets you set the color for an element. For this Action Target the only Operation available is "Set to fixed value". To use this, insert the name of a track color in the Parameter 1 column, e.g. "Color 7" to use dark green as track color.

Selecting a function



The left pop-up menu at the bottom of the Project Logical Editor is where you select the function – the basic type of editing to be performed.

The available options are:

Delete

Deletes all elements found by the Project Logical Editor.

⇒ When you delete automation tracks and undo this operation by selecting Undo from the Edit menu, the automation tracks will be restored, but the tracks will be closed.

Transform

Changes one or several aspects of the found elements. You set up exactly what is changed in the action list.

Select

This will simply select all found elements, highlighting them for further work in the Project window.

Applying Macros

In the Macro pop-up menu you can select a macro that will be executed automatically after completing the actions defined using the Filter and Action lists. This is useful if you would like to extend the already powerful Project Logical Editor features even further.

To use this, you set up the macro that you need in the Key Commands dialog (see [“Setting up key commands”](#) on [page 581](#)) and then select it in the Project Logical Editor from the Macro pop-up menu.

For example, you can use the filter conditions to select all tracks that contain automation data for a certain automation parameter (such as “volume”) and use the macro “Select all on Track + Delete” to remove the automation events from these tracks (without deleting the tracks themselves).

Applying the defined actions

Once you have set up filter conditions, selected a function and set the required actions (or loaded a preset), you apply the actions defined with the Project Logical Editor by clicking the Apply button.

Project Logical Editor operations can be undone just like any other editing.

Working with presets

The Presets section in the upper left section of the window allows you to load, store and manage Project Logical Editor presets. A preset contains all settings in the window, which means you can simply load a preset, edit the settings (if necessary) and click Apply.

- To load a preset, select it from the Presets pop-up menu. If available, an explanatory text appears to the right of the menu. When setting up your own presets, you can click in this area to enter a description.
- You can also open the Edit menu and select Presets directly from the “Process Project Logical Editor” submenu. This allows you to apply a preset directly, without having to open the Project Logical Editor.

Storing your own settings as a preset

If you have made Project Logical Editor settings that you want to use again, you can store them as a preset:

1. Click the Store Preset button to the right of the Presets pop-up menu.

A dialog for specifying a name for the new preset is displayed.

2. Enter a name for the preset and click OK.
The preset is stored.

⇒ To remove a preset, load it and click the Remove Preset button.

Organizing and sharing presets

The Project Logical Editor presets are stored within the application folder in the Presets\Logical Edit Project subfolder. While these files cannot be edited manually, you can reorganize them (e.g. putting them in subfolders) like any files.

This also makes it easy to share presets with other Nuendo users, by transferring the individual preset files.

⇒ The list of presets is read each time the Project Logical Editor is opened.

Setting up key commands for your presets

If you have stored Project Logical Editor presets, you can set up key commands for them:

1. Pull down the File menu and select “Key Commands...”.

The Key Commands dialog opens.

2. Use the list in the Commands column to navigate to the category “Process Project Logical Editor” and click the “+” sign to display the items in the folder.

3. In the list, select the item to which you wish to assign a key command, click in the “Type in Key” field and enter a new key command.

4. Click the Assign button above the field.

The new key command appears in the Keys List.

5. Click OK to exit the dialog.

For more information on Key Commands, see the chapter “[Key commands](#)” on [page 580](#).

Background

Whenever you create a new project, Nuendo will automatically set the tempo and time signature for this project. The tempo and signature settings can be displayed in two ways: either on dedicated tracks in the Project window, or in the Tempo Track Editor.

Tempo modes

Before we go into detail about tempo and signature settings, you should understand the different tempo modes.

For each track in Nuendo that can make use of this function, you can specify whether it is time-based or tempo-based (see [“Switching between musical and linear time base”](#) on [page 63](#)). For tempo-based tracks, the tempo can either be fixed throughout the entire project (this is called “fixed tempo mode”) or follow the tempo track (this is called “tempo track mode”), which may contain tempo changes.

- To switch between fixed tempo mode and tempo track mode, use the Tempo button on the Transport panel:



When the Tempo button is lit (and the text “Track” is shown), the tempo follows the tempo track; when it is deactivated (and the text “Fixed” is shown), a fixed tempo is used (see [“Setting the fixed tempo”](#) on [page 456](#)). You can also switch the tempo mode with the Activate Tempo Track button on the Tempo Track Editor toolbar.

In tempo track mode, the tempo cannot be changed on the Transport panel, i.e. the tempo information here is for display purposes only.

Signature events are always active, regardless of whether fixed tempo mode or tempo track mode is selected.

A note about tempo-based audio tracks

For tempo-based tracks, the start position of audio events on the timeline depends on the current tempo setting. However, it is important to realize that the actual audio (“within” the events) will play back as recorded, regardless of any tempo changes you make. Therefore, it is good practice to make the proper tempo and time signature settings before you start recording tempo-based audio.

- To make an already recorded audio track follow the tempo changes, you can use the Sample Editor, see the chapter [“The Sample Editor”](#) on [page 282](#).

How well this works depends on the character of the audio recordings, since the hitpoint detection feature works best with fairly rhythmical material.

- To adapt the tempo track to time-based material, you can use the Time Warp tool, see [“The Time Warp tool”](#) on [page 459](#).

This allows you to adjust the tempo track so that tempo-based material (e.g. positions in music) coincides with time-based material (positions in narration, video, etc.).

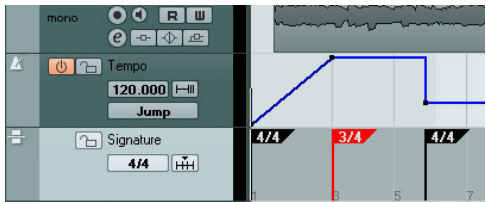
Tempo and signature display

You can view the current tempo and signature settings of your project in a number of ways:

- On the Transport panel.
See above, and the section [“The Transport panel”](#) on [page 84](#).
- By displaying the tempo track and the signature track in the Project window.
Open the Project menu, select Add Track and the Signature and/or Tempo options.
- In the Tempo Track Editor.
Open the Project menu and select Tempo Track Editor, or [Ctrl]/[Command]-click the Tempo button on the Transport panel.

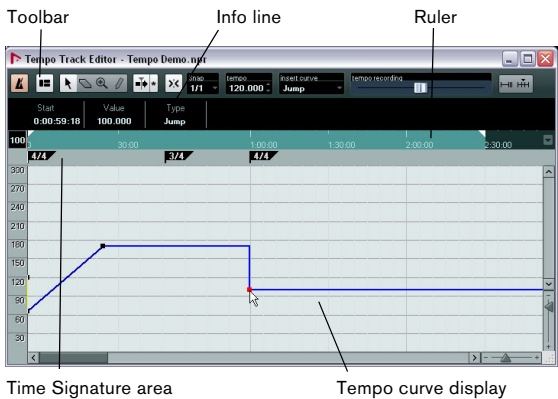
About the tempo and signature tracks

The tempo track and the signature track allow you to view and edit tempo and signature data in the project context.



- The Inspectors for these tracks show the positions and values of individual tempo curve points or signature events.
- The signature track's background always shows bars. This is independent of the ruler display format setting.
- In the track list for the tempo track, on the far right, you can specify the display range by clicking on the numbers at the top or bottom and dragging up or down. Note that this does not change the tempo setting, but changes the display scale of the tempo track.
- You can lock the tempo track and the signature track to prevent unintentional editing. Simply click the lock symbols in the track list to lock/unlock the tracks.

About the Tempo Track Editor

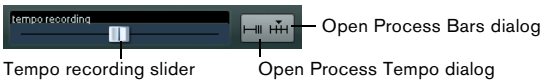
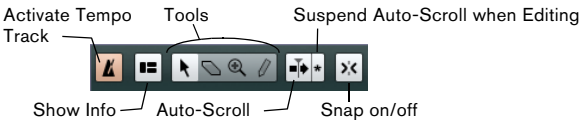


If you do not want to display two extra tracks in the Project window, you can also open the Tempo Track Editor to view and edit tempo and signature information.

The Tempo Track Editor has a toolbar, info line and ruler just like other editors in Nuendo, plus an area for the display of time signature events and a tempo curve display.

The toolbar

The toolbar contains various tools and settings:



- The tools for Object Selection, Erase, Zoom and Draw are used in the same way as in other editors. The Snap and Auto-Scroll functions also work exactly like in the Project window. Note that in the Tempo Track Editor, the Snap function affects tempo events only. Time signature events always snap to the beginning of bars.

- The info line in the Tempo Track Editor allows you to change settings for selected time signature events, and the type and tempo of selected tempo curve points.
- The ruler in the Tempo Track Editor shows the timeline, and is similar to the ruler in the Project window. See [“The ruler”](#) on page 47 for details.
- The area below the ruler shows time signature events.

- The main display shows the tempo curve (or, if fixed tempo mode is selected, the fixed tempo – see [“Setting the fixed tempo”](#) on page 456). To the left of the display you will find a tempo scale to help you quickly locate the desired tempo. Note that the vertical “grid lines” in the tempo curve display correspond to the display format selected for the ruler.

Editing tempo and signature

You can use the options of the Tempo Track Editor or the tempo and signature tracks to edit tempo and signature settings. The descriptions given below are valid in both cases. The only exception is the tempo recording slider (see below) which is available only in the Tempo Track Editor.

Editing the tempo curve

⚠ This section assumes that you are working in tempo track mode, i.e. the Tempo button must be activated on the Transport panel.

Adding tempo curve points

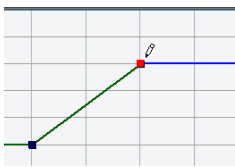
1. Use the “Insert curve” pop-up menu (on the toolbar of the Tempo Track Editor) or the “Type of New Tempo points” pop-up menu in the track list for the tempo track to select whether you want the tempo to change gradually from the previous curve point to the new one (“Ramp”) or change instantly to the new value (“Jump”).

You can also set this to Automatic. In this case, the types of existing tempo curve points will be used when inserting new points at the same position.

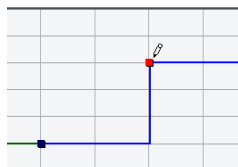
2. Select the Pencil tool.

3. Click and drag in the tempo curve display to draw a tempo curve.

When you click, the tempo display on the toolbar shows the tempo value. If Snap is activated on the toolbar, this determines at which time positions you can insert tempo curve points, see “The Snap function” on page 48.



Insert curve set to “Ramp”



Insert curve set to “Jump”

- You can also click on the tempo curve with the Arrow tool. This adds a single point with each click.

⇒ Tempo values can also be automatically inserted by the Beat Calculator, see “The Beat Calculator” on page 458.

Selecting tempo curve points

Curve points can be selected as follows:

- Using the Arrow tool. The standard selection techniques apply.
- Using the Select submenu of the Edit menu. The options are:

Option	Description
All	Selects all curve points on the tempo track.
None	Deselects all curve points.
In Loop	Selects all curve points between the left and right locator.
From Start to Cursor	Selects all points to the left of the project cursor.
From Cursor to End	Selects all points to the right of the project cursor.

- You can also use the left and right arrow keys on the computer keyboard to go from one curve point to the next. If you press [Shift] and use the arrow keys, you can select several points at the same time.

Editing tempo curve points

Curve points can be edited in the following ways:

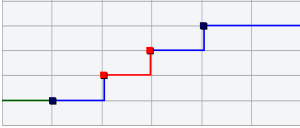
- By clicking and dragging horizontally and/or vertically with the Arrow tool. If several points are selected, all of them are moved. If Snap is activated on the toolbar, this determines to which time positions you can move curve points, see “The Snap function” on page 48.
 - By adjusting the tempo value in the tempo display on the Tempo Track Editor toolbar, in the Inspector or on the info line.
- ⇒ Selecting several points and changing the tempo value in the info line leads to a relative adjustment of the tempo values.

⚠ We recommend using the Bars+Beats display format when editing tempo curves. Otherwise, you may get confusing results. This is because moving a point will change the relationship between tempo and time. If you move a tempo point to the right and drop it at a certain time position, the mapping between tempo and time will be adjusted. Since you have changed the tempo curve, the moved point will appear at another position.

Adjusting the curve type

You can change the curve type of a tempo curve segment at any time, using the following method:

1. With the Arrow tool, select all curve points within the segment you want to edit.



2. In the info line, click below the word “Type” to switch the curve type between “Jump” and “Ramp”.

The curve sections between the selected points are adjusted.



Removing tempo curve points

To remove a curve point, either click on it with the Erase tool or select it and press [Backspace]. The first tempo curve point cannot be removed.

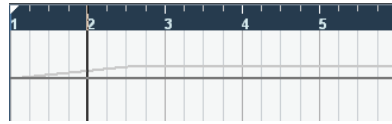
Recording tempo changes



The Tempo Recording slider on the toolbar of the Tempo Track Editor allows you to record tempo changes “on the fly”: simply start playback and use the slider to raise or lower the tempo at the desired positions. This is useful for creating natural sounding ritardandos, etc.

Setting the fixed tempo

When the tempo track is deactivated, the tempo track curve is grayed out (but still visible). Since the tempo is fixed throughout the whole project, there are no tempo curve points. Instead, the fixed tempo is displayed as a horizontal black line in the tempo curve display.



To set the tempo in fixed mode:

- Adjust the value numerically in the tempo display on the Tempo Track Editor toolbar or in the track list.
- On the Transport panel, click on the tempo value to select it, enter a new value and press [Enter].

Adding and editing time signature events

- To add a time signature event, click in the time signature area/track with the Pencil tool.

This adds a default 4/4 time signature event at the closest bar position. Remember: When the Arrow tool is selected, pressing [Alt]/[Option] will give you the Pencil tool.

- To edit the value of a time signature event, select it and adjust the value on the info line, or double-click the event and enter a new value.

Note that there are two controls for the signature display; the left one adjusts the numerator and the right one adjusts the denominator.

- To move a time signature event, click and drag it with the Arrow tool.

Note that you can [Shift]-click to select multiple events. Also note that time signature events can only be positioned at the start of bars. This is also true if Snap is deactivated.

- To remove a time signature, either click on it with the Erase tool or select it and press [Backspace] or [Delete]. The first time signature event cannot be removed.

Exporting and importing tempo tracks

You can export the current tempo track for use in other projects by selecting “Tempo Track” from the “Export” submenu of the File menu. This allows you to save the tempo track information (including time signature events) as a special XML file (file extension “.smt”).

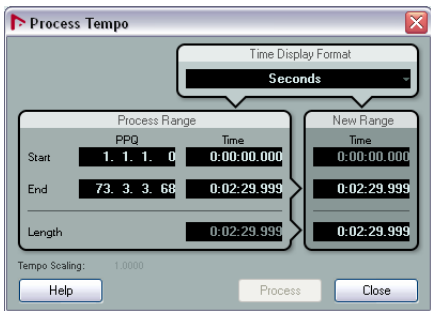
To import a tempo track, select “Tempo Track” from the Import submenu of the File menu. Note that this replaces all tempo track data in the current project (although the operation can be undone if needed).

Process Tempo

Process Tempo allows you to define a specific length or end time for a set range, and the tempo track will automatically set a tempo that will fit the range in the specified time.

Proceed as follows:

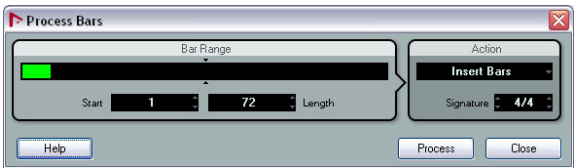
- 1. Specify a region or range that you wish to process by setting the left and right locators, either in the Tempo Track Editor or in the Project window.
 - 2. Click on the Process Tempo button (either in the Tempo Track Editor or on the tempo track).
- The Process Tempo dialog opens.



- 3. In the Process Range fields, the specified range is shown, in Bars and Beats (PPQ) and in a time format, which can be selected from the Time Display Format pop-up menu. The range defined in step 1 will already be set, but you can edit the range by adjusting the values in the Process Range fields if you wish.
- Now you can either specify a new range length or a new range end time. What to choose depends on whether the range should have a specific length or whether it should end at a specific time position.
- 4. Enter the desired End or Length in the corresponding fields of the New Range section. You can select a time format for the new range in the Time Display Format pop-up menu.
 - 5. Click Process.
- Now the tempo track is automatically adjusted, and the range will have the specified duration.

The Process Bars dialog

The Process Bars dialog (opened from the Tempo Track Editor or the signature track) uses the global “Insert Silence” and “Delete Time” functions from the Range sub-menu of the Edit menu. However, the necessary ranges (or parameters) are calculated using a musical “bars+beats-based” environment. The function also ensures that the time signatures stay “in sync” after these operations. This allows for a much more intuitive approach when inserting, deleting or replacing “time” while working with a project set to the Bars+Beats time type.



The dialog contains the following elements:

Option	Description
Bar Range	The Bar Range display shows the bar range within the project as well as its length. Click on the right edge of the green indicator and drag it to the right to enlarge the range. You can also use the Start and Length value fields (see below). The arrow pair in this section marks the length of the current project. The area to the right marks the bar range that can be added (500 bars max.).
Bar Range – Start	This is where you specify the start position for the bar range. Click on the arrows to raise/lower the value or click directly in the value field to enter the value manually.
Bar Range – Length	This is where you specify the length of the bar range. Click on the arrows to raise/lower the value or click directly in the value field to enter the value manually.
Action – Insert Bars	When you select this action, clicking the Process button will insert the specified number of empty bars with the set time signature at the start position specified above.
Action – Delete Bars	When you select this action, clicking the Process button will delete the specified number of bars, beginning at the start position specified above.
Action – Reinterpret Bars	When you select this action, clicking the Process button will reinterpret the bar range to fit the specified time signature. This is very special in the sense that both bars+beats positions of the notes and the tempo are being changed to fit the new time signature, but the playback of the notes will stay just the same. For example, if you want to reinterpret a bar with the time signature 3/4 so that it gets the time signature 4/4, quarter notes will become half note triplets. If you reinterpret a bar with the time signature 4/4 to attain 3/4, you will get quadruplets.

Option	Description
Action – Replace Bars	When you select this action, clicking the Process button will cause the time signature of the specified bar range to be replaced by the one you specify in this dialog.
Action – Signature	This lets you specify the time signature for the action you select on the Action pop-up menu (except for the Delete Bars action).
Process	Click on this button to apply your changes to the specified bar range.
Close	Clicking this button without clicking on "Process" first will close the dialog without applying your settings.

The Beat Calculator



The Beat Calculator is a tool for calculating the tempo of freely recorded audio or MIDI material. It also allows you to set the tempo by tapping.

Calculating the tempo of a recording

1. In the Project window, make a selection that covers an exact number of beats of the recording.
2. Select "Beat Calculator..." from the Project menu. The Beat Calculator window appears.
3. In the Beats field, enter the number of beats that the selection encompasses. The corresponding tempo is calculated and displayed in the BPM field.
 - If you need to adjust the selection, you can go back to the Project window, leaving the Beat Calculator open. To re-calculate the tempo after adjusting the selection, click Refresh.

4. You can also insert the calculated tempo into the tempo track by clicking one of the buttons in the lower left corner of the Beat Calculator window.

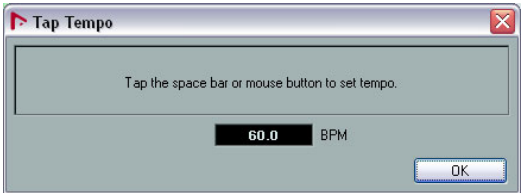
Clicking "At Tempo Track Start" will adjust the first tempo curve point, while "At Selection Start" will add a new tempo curve point at the selection's start position, using the "Jump" curve type (see ["Adding tempo curve points"](#) on [page 455](#)).

⚠ If fixed tempo mode is selected when you insert the calculated tempo, the fixed tempo will be adjusted, regardless of which button you click.

Using Tap Tempo

The Tap Tempo function allows you to specify a tempo by tapping:

1. Open the Beat Calculator.
2. If you want to tap the tempo to some recorded material, activate playback.
3. Click the Tap Tempo button. The Tap Tempo window appears.



4. Tap the tempo on the Spacebar of the computer keyboard or with the mouse button. The tempo display will update the calculated tempo between each tap.
5. Click OK to close the Tap Tempo dialog. The tapped tempo is now shown in the Beat Calculator's BPM display. You can insert it into the tempo track as described above.

Merge Tempo From Tapping

This function allows you to create a complete tempo track based on your tapping. Typically, you would use this if you have an audio file with no tempo mapping and want to be able to add other material afterwards, etc.

1. Create an empty time-based MIDI track and, while playing back your audio material, tap the new tempo on your MIDI keyboard and record the created notes onto the new MIDI track.

Note that you must create note events – pedal events cannot be used for this function.

2. Play back the audio and check that the timing of the MIDI notes corresponds to that of the audio.

If necessary, edit the MIDI notes in an editor.

3. Select the MIDI part (or the individual notes in an editor) that you want to use for the calculation.

4. Select “Merge Tempo From Tapping” from the Functions submenu of the MIDI menu.

A dialog opens.

5. In the dialog, specify what type of note (1/2, 1/4, etc.) you tapped during the recording.

If you activate the “Begin at Bar Start” option, the first note will automatically start at the beginning of a bar when calculating the new tempo curve.

6. Click OK.

The project’s tempo is adjusted to the tapped notes.

7. Open the Project menu and select “Tempo Track” to check that the new tempo information is reflected in the tempo curve.

⇒ Another way of creating a tempo map for freely recorded audio would be to use the Time Warp tool, see below.

The Time Warp tool

The Time Warp tool lets you adjust the tempo track so that “musical time-based” material (positions related to the tempo) matches “linear time-based” material (positions in time). Some typical applications:

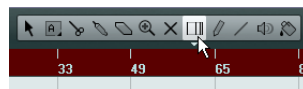
- When you have recorded music (audio or MIDI) without tempo reference or metronome click, the Time Warp tool can be used for creating a tempo map that fits the recording (allowing you to rearrange or add other material).
- When you are creating music for a movie and want to match certain positions in the video with certain positions in the music.

The Time Warp tool makes use of the fact that tracks can be based on time positions (linear time base) or positions related to tempo (musical time base), see [“Switching between musical and linear time base”](#) on [page 63](#) for a description of these modes.

Basic procedure

You use the Time Warp tool to drag a musical position (a position in bars+beats format) to a certain position in time. This can be done in the Project window or in an editor, as described below. Here is the general procedure:

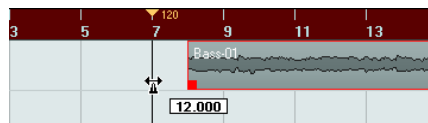
1. Make sure tempo track mode is active.
You cannot use the Time Warp tool in fixed tempo mode.
2. Select the Time Warp tool.



Bars+Beats format is automatically selected for the ruler in the active window, and the ruler is shown in brown.

3. Click in the window at a musical position and drag it so that it matches a position in the material you are editing – e.g. the start of an event, a certain “hit” within an audio event, a frame in a video clip, etc.

When you click with the Time Warp tool, it snaps to the grid in the window.



Dragging the start of the bar to the start of the audio event.

While you are dragging, the track(s) you are editing are temporarily switched to linear time base. This means that the contents of the tracks remain at the same time positions regardless of the tempo (there is an exception to this in the Project window, see below).

4. When you release the mouse button, the musical position you clicked on matches the time position you dragged it to.

This is because the Time Warp tool changed the last tempo event on the tempo track (and/or added new ones, depending on window and usage), thereby scaling the tempo track to fit.

Rules

- When you use the Time Warp tool, the tempo value of the last tempo event (before the click position) is adjusted.

- If later tempo events exist, a new tempo event will be created at the click position. This way, the later tempo event(s) will not be moved.

- If you press [Shift] and use the Time Warp tool, a new tempo event is created at the click position.

[Shift] is the default modifier for this – you can adjust this in the Preferences dialog (Editing–Tool Modifiers page).

- If you use the Time Warp tool in an editor, a tempo event will be created at the start of the edited part or event. Only the currently edited track will be affected – but note that events to the right of the edited events or parts (on the edited track) will be affected as well.

- If you have made a selection range and use the Time Warp tool within that range, the tempo changes will be confined to that range.

This means tempo events will be inserted at the start and end of the selection range, if needed – useful if you need to adjust the tempo within a certain area but want all material outside that range to stay in place.

- When you click with the Time Warp tool, it snaps to the tempo grid in the window.

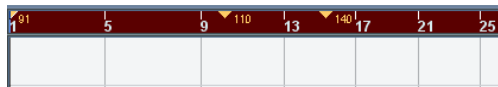
- When you drag the tempo grid to a new position, it can be magnetic to events in the window.

In the Project window, this requires that Snap is activated and “Events” is selected on the Snap Type pop-up menu – the grid will then snap to the start and end of events or parts, and to markers. In the Sample Editor, this requires that Snap is activated – the grid will then snap to hitpoints (if any). In the MIDI editors, this requires that Snap is activated – the grid will then snap to the start and end of notes.

- The function will create tempo values up to 300bpm.

Viewing and adjusting tempo events

When you select the Time Warp tool, the ruler of the active window is shown in brown. Existing tempo events are shown in the ruler as “flags” with the tempo values displayed.



This helps you see what's going on, but you can also use this for editing the tempo track:

- If you press the create/erase modifier key (by default [Shift]) and click on a tempo event in the ruler, it is deleted.

- You can click on a tempo event in the ruler and drag to move it.

This automatically edits the tempo value in the event so that elements to the right keep their positions.

- If you press [Alt]/[Option] and move (or delete) a tempo event in the ruler, the tempo value is not adjusted – this means elements to the right will be moved.

This is the default modifier key for this – you can adjust it in the Preferences dialog (Editing–Tool Modifiers page).

Using the Time Warp tool in the Project window

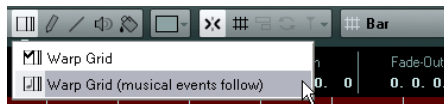
In the Project window, there are two modes for the Time Warp tool. To select the desired option, click on the Time Warp tool and click again to open a context menu. The available options are:

- Warp Grid

This is the default mode. If you use it, all tracks are temporarily switched to linear time base. This means that all tracks will keep their absolute time positions when you adjust the tempo track.

- Warp Grid (musical events follow)

If you use this mode, no tracks are switched to linear time base. This means that all tracks that are not set to linear time base will follow the changes you make to the tempo track.



Matching a musical score to video

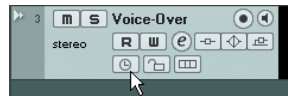
Here's an example of how to use the Time Warp tool in "musical events follow" mode. Let's say you are creating the music for a film. You have a video track, an audio track with a commentary and some audio and/or MIDI tracks with your music. Now you want to match the position of a musical cue to a position in a video film. The musical cue is located in bar 33. There are no tempo changes in the project (yet).

1. Make sure tempo track mode is selected on the Transport panel.
2. Now you need to locate the position in the video. If you do not need very high precision, you can simply locate it looking at the thumbnails on the video track – otherwise you can pinpoint the exact position and add a marker to the marker track (that you can snap to later on). You can also make a note of the exact position and add an extra ruler track set to show the timecode.
3. Make sure that the correct tracks are set to linear time base or musical time base, respectively.

In our example, we want the video track and the audio track with a commentary voice-over to be linear time-based (as well as the marker track, if used). All other tracks should be set to musical time base. You change this by clicking the time base button in the track list or Inspector.



Musical time base selected



Linear time base selected

4. Set up the Grid Type pop-up menu as desired.

When you click with the Time Warp tool, it snaps to the selected grid. In this case, you will find the musical cue at the start of bar 33, so we can set the grid to "Bar".

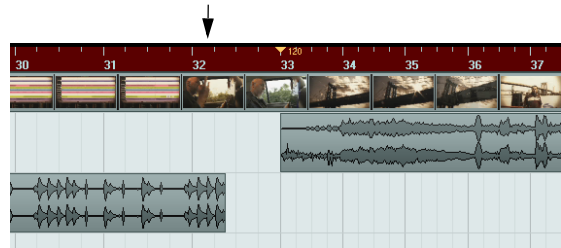
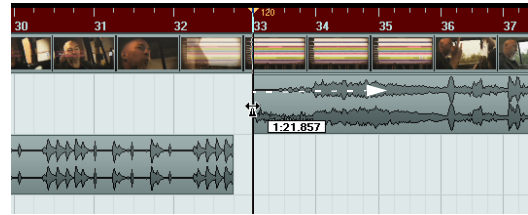
- Note that this affects the snapping to the ruler (tempo grid) when you click! In addition, the tool can be "magnetic" to events in the Project window when you drag – for this, you need to activate the Snap function, open the Snap Type pop-up menu, and select "Events".

In our example, this would be useful if you created a marker at the desired position in the video – when you drag the grid (see below), it will snap to the marker.

5. Click on the Time Warp button and click again to open a pop-up menu.
6. Select the "Warp Grid (musical events follow)" mode.

7. Click in the event display at the start of bar 33 and drag to the desired position in the video.

As mentioned above, this can mean dragging to a position indicated by the thumbnails on the video track, to a marker on the marker track or to a time position on an additional ruler track.



When you drag, the ruler is scaled – and the music tracks will follow.

8. Release the mouse button.

If you look in the ruler at the beginning of the project, you will see that the first (and only) tempo event has been adjusted.

9. Try playing back.

The musical cue should now happen at the correct position in the video.

Let's say you need to match another cue to another position later on in the video. If you simply repeat this procedure, you will find that the first cue gets out of sync – since you are still changing the first (and only) tempo event on the tempo track!

You need to create a "lock point" – a tempo event at the first cue position:

10. Press [Shift] and click with the Time Warp tool in the event display at the cue position.

In our case, this is bar 33.

A tempo event (with the same value as the first one) is added at that position.

11. Now match the second musical cue to the correct video position by dragging the musical position to the desired time position as before.

The new tempo event is edited – the first tempo event is unaffected and the original cue is still matched.

- If you know you are going to match several cues this way, make it a habit to press [Shift] each time you use the Time Warp tool to match positions.

This adds a new tempo event – that way, you do not have to add tempo events afterwards as described above.

About snapping

If Snap is activated in the Project window and “Events” is selected on the Snap Type pop-up menu, the Time Warp tool will be magnetic to events when you drag the tempo grid. This makes it easier to snap a tempo position to a marker, the start or end of an audio event, etc.

Using the Time Warp tool in an audio editor

Using the Time Warp tool in the Sample Editor or Audio Part Editor is different from using it in the Project window, in the following ways:

- When you use the Time Warp tool, a tempo event is automatically inserted at the beginning of the edited event or part. This tempo event will be adjusted when you warp the tempo grid with the tool.

This means that material before the edited events will not be affected.

- Only the default mode for the Time Warp tool is available.

This means that when you use the tool, the edited track is temporarily switched to linear time base.

Making a tempo map for a “free” recording

The following example shows how to use the Time Warp tool in the Sample Editor to create a tempo map matching freely recorded music. Let’s say you have recorded a drummer, playing without a metronome – this typically

means the tempo varies ever so slightly. To be able to add more material and easily rearrange the recorded audio, you want the tempo in Nuendo to match the recorded drum track:

1. If necessary, move the recorded event.

Move it so that the first downbeat (“one”) happens at the start of the bar – zoom in if needed.

2. Open the drum recording in the Sample Editor and make sure Hitpoint mode is not selected.

The Time Warp tool cannot be used in Hitpoint mode. However, if you have calculated hitpoints already, these will be visible when the Time Warp tool is selected (see below).

3. Set the zoom so that you can see the individual drum hits clearly.

To achieve this type of “visual” beat matching, it is important to have a fairly clean recording, such as the drum track in this example.

4. Select the Time Warp tool.

You have already matched the first downbeat with the start of a bar. However, if the recording starts before the first downbeat (with a fill, some silence, etc.), you want to “lock” the first downbeat so that it stays in position:

5. Press [Shift] and click in the event at the position of the first downbeat (the start of the bar).

When you press [Shift], the pointer turns into a pencil. Clicking adds a tempo event at the first downbeat – when you later adjust the tempo with the Time Warp tool, the first downbeat will stay in place. Note that if the event starts exactly on the first downbeat (no audio before the “one”), you do not need to do this. This is because a tempo event is automatically added at the start of the edited event.

6. Now, locate the start of the next bar in the ruler.

7. Click at that position in the event display and drag to the downbeat of the second bar in the recording.

When you click, the pointer will snap to the ruler grid.

By dragging the grid, you changed the tempo value in the tempo event at the first downbeat. If the drummer held a fairly consistent tempo, the following bars should now match pretty well, too.

8. Check the following bars and locate the first position where the audio drifts from the tempo.

Now, if you simply adjusted that beat in the tempo grid to match the beat in the recording, the tempo event at the first downbeat would be changed – this would ruin the match in the previous bars! We need to lock these by inserting a new tempo event.

9. Locate the last beat that is in sync.

This would be the beat just before the position where the audio and tempo drift apart.

10. Press [Shift] and click at that position to insert a tempo event there.

This locks this matched position. The material to the left will not be affected when you make adjustments further along.

11. Now match the tempo grid to the next (unmatched) beat by clicking and dragging with the Time Warp tool.

The tempo event you inserted in step 10 will be adjusted.

12. Work your way through the recording this way – when you find that the recording drifts from the tempo, repeat steps 9 to 11 above.

Now the tempo track follows the recording and you can add more material, rearrange the recording, etc.

Matching to hitpoints

If you have calculated hitpoints for the audio event you are editing, these will be shown when the Time Warp tool is selected.

- The number of hitpoints shown depends on the Hitpoint Sensitivity slider setting you have made in Hitpoint mode.
- If you activate the Snap to Zero Crossing button on the toolbar, the Time Warp tool will snap to hitpoints when you drag the tempo grid.
- You can use the Create Markers from Hitpoints function (on the Hitpoints submenu of the Audio menu) to create markers at the hitpoint positions. This can be useful when using the Time Warp tool in the Project window, as the tool will be magnetic to markers (if the Snap Type is set to Events).

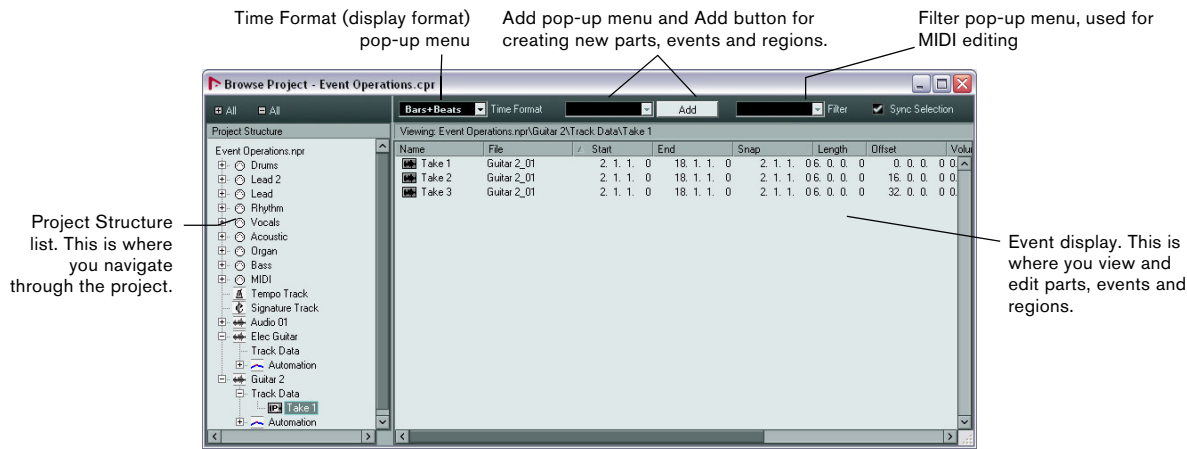
Using the Time Warp tool in a MIDI editor

This is very similar to using the tool in an audio editor:

- When you use the Time Warp tool, a tempo event is automatically inserted at the beginning of the edited part – this tempo event will be adjusted when you warp the tempo grid with the tool. Material before the edited part will not be affected.
- Only the default mode for the Time Warp tool is available. So when you use the tool, the edited MIDI track is temporarily switched to linear time base.
- The rulers in the MIDI editors can be set to “Time Linear” or “Bars+Beats Linear” mode (see “[The ruler](#)” on [page 407](#)) – the Time Warp tool requires Time Linear mode. If necessary, the ruler mode will be switched when you select the Time Warp tool.
- If Snap is activated on the toolbar in the MIDI editor, the tool will snap to the start and end of MIDI notes when you drag the tempo grid.

Typically, you would use the Time Warp tool in a MIDI editor to match the Nuendo tempo to freely recorded MIDI material (much like the audio example above).

Window Overview



The Project Browser window provides a list based representation of the project. This allows you to view and edit all events on all tracks by using regular value editing in a list.

Opening the Project Browser

You open the Project Browser by selecting “Browser” from the Project menu. The Browser window can be open while you are working in other windows; any changes made in the Project window or an editor are immediately reflected in the Project Browser and vice versa.

Navigating in the Browser

You use the Project Browser much like you use the Windows Explorer and Mac OS X Finder for browsing folders on your hard disk:

- Click on an item in the Project Structure list to select it for viewing.
- The contents of the item are shown in the event display.



- Items with hierarchical substructures can be folded out by clicking the “+” symbols or the “closed folder” symbols in the Project Structure list.

When the substructure of an item is revealed, a “-” symbol or an “open folder” symbol is shown instead – click this to hide the substructure.

- To reveal or hide all substructures in the Project Structure list, use the buttons “(+) All” and “(-) All” above the list.

- The actual editing is done in the event display, using regular value editing techniques.
- There is one exception: You can rename items in the Project Structure list by clicking on their names and typing.

Customizing the view

You can drag the divider between the Project Structure list and the event display to make one of them wider and the other narrower. Furthermore, the event display can be customized in the following ways:

- You can change the order of the columns by dragging the column headings to the left or right.
- You can resize columns by dragging the dividers between the column headings.
- To select a display format for all position and length values, use the Time Format pop-up menu.

- You can sort events in the display by columns, by clicking the column heading.
For example, if you want to sort events by their start positions, click that column heading. An arrow appears in the column heading, indicating that events are sorted by that column. The direction of the arrow indicates whether the events are sorted in ascending or descending order. To change the direction, click the column heading again.

Importing files via the MediaBay

You can also import audio, video and MIDI files into the Project Browser via the MediaBay using drag and drop.

- ⇒ You can only import into existing tracks. This means, for example, that a video track has to exist in the Project window prior to importing a video file in the Project Browser.

For more information about the MediaBay, see [“The Media-Bay”](#) on [page 334](#).

About the Sync Selection option

If the “Sync Selection” checkbox is activated (on the Project Browser toolbar), selecting an event in the Project window automatically selects it in the Project Browser, and vice versa. This makes it easy to locate events in the two windows.

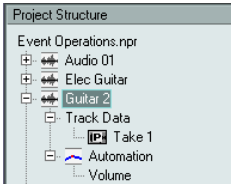
Editing tracks

Editing audio tracks

Audio tracks can have two “subitems”: Track Data and Automation.

- The Automation item corresponds to the automation track in the Project window, and contains the track's automation events (see [“Editing automation tracks”](#) on [page 468](#)).
- The Track Data item corresponds to the actual audio track in the Project window. It contains audio events and/or audio parts, which in turn can contain audio events.

Note that if you have not performed any automation or opened an automation track, the Browser will only contain the audio data.



The following parameters are available for the different items:

The list columns for audio events

Parameter	Description
Name	Allows you to change the name of the event. Double-clicking on the waveform image beside it opens the event in the Sample Editor.
File	The name of the audio file referenced by the event's audio clip.
Start	The start position of the event. If the event belongs to an audio part, you cannot move it outside the part.
End	The end position of the event.
Snap	The absolute position of the event's snap point. Note that adjusting this value will not change the position of the snap point within the event – instead it is another way of moving the event!
Length	The length of the event.
Offset	This determines “where in the audio clip” the event starts. Adjusting this value is the same as sliding the contents of the event in the Project window (see “Sliding the contents of an event or part” on page 74). You can only specify positive Offset values, since the event cannot start before the start of the clip. Likewise, it cannot end after the end of the clip. If the event already plays the whole clip, the Offset cannot be adjusted at all.
Volume	The volume of the event, as set with the Volume handle or on the info line in the Project window.
Fade In Fade Out	The length of the fade-in and fade-out areas respectively. If you use these settings to add a fade (where there previously was none), a linear fade will be created. If you adjust the length of an existing fade, the previous fade shape will be maintained.
Mute	Click in this column to mute or unmute the event.
Image	Displays a waveform image of the event inside a gray box corresponding to the clip. The image is scaled according to the width of the column.

The list columns for audio parts

Parameter	Description
Name	The name of the part. Double-clicking on the part symbol beside it opens the part in the Audio Part Editor.
Start	The start position of the part. Editing this value is the same as moving the part in the Project window.
End	The end position of the part. Editing this value is the same as resizing the part in the Project window.
Length	The length of the part. Editing this value is the same as resizing the part in the Project window.
Offset	This adjusts the start position of the events within the part. Adjusting this value is the same as sliding the contents of the part in the Project window (see “Sliding the contents of an event or part” on page 74). Setting a positive Offset value is the same as sliding the contents to the left, while a negative Offset corresponds to sliding the contents to the right.
Mute	Click in this column to mute or unmute the part.

Creating audio parts

When the “Audio” item of an audio track is selected in the Project Structure list, you can create empty audio parts on the track by clicking the Add button on the toolbar. This will insert a part between the left and right locator.

Editing MIDI tracks

Just like audio tracks, MIDI tracks can have two “subitems”: Track Data and Automation.

- The Track Data item corresponds to the actual MIDI track in the Project window and can contain MIDI parts (which in turn can contain MIDI events).
- The Automation item corresponds to the automation track in the Project window, and contains the track's automation events (see [“Editing automation tracks” on page 468](#)).

Note that if you have not performed any automation or opened an automation track, the Browser will only contain the MIDI data.

When editing the Track Data, the following parameters are available:

The list columns for MIDI events

Parameter	Description
Type	The type of MIDI event. This cannot be changed.
Start	The position of the event. Editing this value is the same as moving the event.

Parameter	Description
End	This is only used for note events, allowing you to view and edit the end position of a note (thereby resizing it).
Length	This is only used for note events. It shows the length of the note – changing this resizes the note and automatically changes the End value as well.
Data 1	The property of this value depends on the type of MIDI event: For notes, this is the note number (pitch). This is displayed and edited as a note name and an octave number, with the values ranging between C-2 and G8. For controller events, this is the type of controller, displayed in words. Note that you can edit this by entering a number – the corresponding controller type is automatically displayed. For pitchbend events, this is the fine adjustment of the bend amount. For poly pressure events, this is the note number (pitch). For other event types, this is the value of the event.
Data 2	The property of this value depends on the type of MIDI event: For notes, this is the note-on velocity. For controller events, this is the value of the event. For pitchbend events, this is the coarse bend amount. For poly pressure events, this is the amount of pressure. For other event types, this is not used.
Channel	The event's MIDI channel, see “Notes” on page 106 .
Comment	This column is used for some event types only, providing an additional comment about the event.

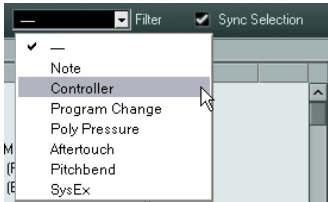
The list columns for MIDI parts

Parameter	Description
Name	The name of the part.
Start	The start position of the part. Editing this value is the same as moving the part.
End	The end position of the part. Changing this is the same as resizing the part (and will automatically affect the Length value as well).
Length	The length of the part. Changing this resizes the part and automatically changes the End value.
Offset	This adjusts the start position of the events within the part. Adjusting this value is the same as sliding the contents of the part in the Project window (see “Sliding the contents of an event or part” on page 74). Setting a positive Offset value is the same as sliding the contents to the left, while a negative Offset corresponds to sliding the contents to the right.
Mute	Click in this column to mute or unmute the part.

⇒ For SysEx (system exclusive) events, you can only edit the position (Start) in the list. However, clicking the Comment column opens the SysEx Editor, in which you can perform detailed editing of system exclusive events. For a description of this, see [“Working with SysEx messages”](#) on [page 427](#).

Filtering MIDI events

When you are editing MIDI in the Project Browser, the large number of different MIDI events displayed can make it hard to find the events you want to edit. The Filter pop-up menu allows you to select a single event type for display.



When this option is selected, only Controller events will be shown in the event display. To show all event types, select the top item (“---”) from the menu.

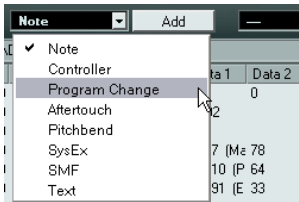
Creating MIDI parts

When a MIDI track is selected in the Project Structure list, you can create empty MIDI parts on the track by clicking the Add button. This will insert a part between the left and right locator.

Creating MIDI events

You can use the Project Browser to create new MIDI events:

1. Select a MIDI part in the Project Structure list.
2. Move the project cursor to the desired position for the new event.
3. Use the Add pop-up menu above the event display to select which type of MIDI event to add.

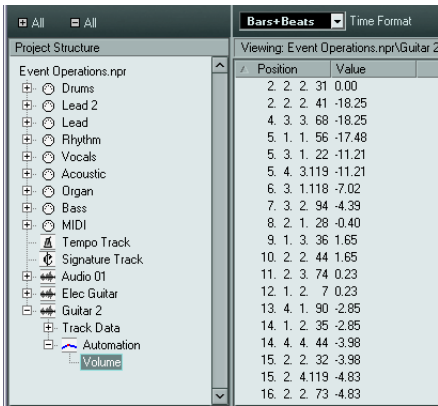


4. Click the Add button.

An event of the selected type is added to the part, at the project cursor position. If the cursor is outside the selected part, the event is added at the beginning of the part.

Editing automation tracks

All kinds of Nuendo automation (the automation tracks for MIDI, instrument, audio, group, and FX channel tracks, or the individual automation tracks for VST instruments, ReWire channels, or input and output busses) are handled in the same way in the Project Browser. Each Automation item in the Project Structure list will have a number of sub-entries, one for each automated parameter. Selecting one of these parameters in the Project Structure list shows its automation events in the list:



You can use the two columns in the list to edit the position of the events and their values.

Editing the video track

When the video track is selected in the Project Structure list, the event display lists the video events on the track, with the following parameters:

Column	Description
Name	The name of the video clip that the event refers to.
Start	The start position of the event. Editing this value is the same as moving the event.
End	The end position of the event. Editing this value is the same as resizing the event, and will automatically change the Length value as well.

Column	Description
Length	The length of the event. Editing this value is the same as resizing the event, and will automatically change the End value as well.
Offset	This determines “where in the video clip” the event starts. Note that the event cannot start before the start of the clip, or end after the end of the clip. Thus, if the event already plays the whole video clip, the Offset cannot be adjusted at all.

Editing marker tracks

Marker events have the following parameters:

Column	Description
Description	The name of the marker. This can be edited for all markers except the left and right locator.
Start	The position of “regular” markers or the start position of cycle markers.
End	The end positions of cycle markers. Editing this value is the same as resizing the cycle marker, and will automatically change the Length value as well.
Length	The length of cycle markers. Editing this value is the same as resizing the marker, and will automatically change the End value as well.
ID	The number of the marker. For regular (non-cycle) markers, this corresponds to the key commands used for navigating to the markers. For example, if a marker has ID 3, pressing [Shift]-[3] on the computer keyboard will move the song position to that marker. By editing these values, you can assign the most important markers to key commands. Note that you cannot edit the “L” and “R” marker IDs (left and right locator) or assign IDs 1 and 2 to markers (since these are reserved for the locators).

You can insert markers on the selected marker track by selecting “Marker” or “Cycle Marker” from the Add pop-up menu and clicking the Add button. Regular markers will be added at the current project cursor position while cycle markers will be added between the current left and right locator positions.

⇒ The Project Browser only displays the default attributes.

For further information on markers and marker tracks, refer to the chapter “[Using markers](#)” on [page 136](#).

Editing the tempo track

When the tempo track is selected in the Project Structure list, the event display shows the events on the tempo track, with the following parameters:

Parameter	Description
Position	The position of the tempo event. You cannot move the first event on the tempo track.
Tempo	The tempo value of the event.
Type	This indicates whether the tempo jumps to the value of the event (“Jump” type) or whether it changes gradually from the previous tempo event, creating a ramp (“Ramp” type), see “ Editing the tempo curve ” on page 455 .

You can add new tempo events by clicking the Add button. This creates a jump-type event with the value 120 bpm at the project cursor position. Make sure that there is no other tempo event at the current cursor position.

Editing time signatures

When “Signature track” is selected in the Project Structure list, the event display shows the time signature events in the project:

Parameter	Description
Position	The position of the event. Note that you cannot move the first time signature event.
Signature	The value (time signature) of the event.

You can add new time signature events by clicking the Add button. This creates a 4/4 event, at the beginning of the bar closest to the project cursor position. Make sure that there is no other time signature event at the current cursor position.

Deleting events

The procedure for deleting events is the same for all different track types:

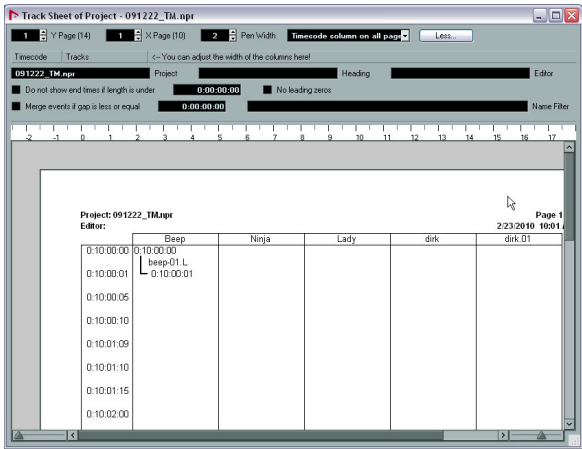
1. Click on an event (or a part) in the Event display to select it.
2. Select Delete from the Edit menu or press [Delete] or [Backspace].

⚠ Note that you cannot delete the first tempo event or the first time signature event.

Overview

The track sheet provides a text-form “flow-chart” representation of the Project. It lists all audio (and video) tracks and their contents, and can easily be printed out.

To open the Track Sheet window, select “Track Sheet” from the Project menu.



The actual track sheet is displayed in the lower part of the window. It contains the following items:

- The leftmost time column contains a list of time positions in the display format selected in the Project Setup dialog. The time positions relate to start and end times of audio or video events or parts on the tracks.
- The following columns display the tracks in the order they appear in the track list. Only audio and video tracks are shown.
- The events are listed in their corresponding track columns in the order they appear (starting at the top).
- For each event, the start and end times are shown, with a vertical line binding the two together.

Viewing the pages in the track sheet

If your project is large (i.e. there are many tracks and/or many events) or if you are working with a large scale factor (see below), the resulting track sheet may have more than one page.

The more tracks you have, the larger the number of pages next to each other (horizontally). The more events you have, the larger the number of pages below each other.

To select which page is visible in the Track Sheet window, you use the “Y Page” and “X Page” fields in the upper left part of the Track Sheet window. Think of the Track Sheet as divided into rows and columns, with “Y Page” determining which row is viewed and “X Page” determining the column. The numbers in parenthesis show the total number of rows and columns, respectively.



In this case, the page in row 2 and column 3 is shown:

X	1	2	3	4
Y				
1				
2				

- The size and proportions of the Track Sheet pages are set with the Page Setup dialog, see [“Printing the track sheet”](#) on [page 472](#).

Adjusting the view

The two sliders at the bottom of the Track Sheet window have the following functionality:

- The slider in the lower left corner is the scale slider. Use this to adjust the actual size of the track sheet contents (including the font sizes). This will also affect the number of tracks and events shown on each page.

- The slider in the lower right corner governs the display zoom.

This affects how much of the track sheet is shown in the Track Sheet window – the printout is not affected.

You can also adjust the width of the columns by dragging the edges of the “Timecode” and “Tracks” fields at the top of the window – this resizes the corresponding columns in the Track Sheet.



Resizing the track columns. If the Timecode and Tracks fields are hidden, click the “More” button.

Additional settings

- The “Pen Width” determines the thickness of the vertical lines that bind together the start and end times for events and parts.
- If the track sheet is more than one page wide, you can use the “Timecode Column” pop-up menu to determine whether the time column only appears on the first page, on each new page, or not at all.

The following settings can be shown or hidden by clicking the “More/Less” button.

Setting	Description
Project	By default, this is the name of the current project, but you can adjust this if you like. The project name will be shown in the top left corner of each track sheet page.
Editor	The editor name you enter will be shown below the project name in the track sheet.
Heading	Allows you to enter a heading (shown centered at the top of each track sheet page).
Do not show end times if length is under...	If this checkbox is ticked, the track sheet will not display the end times of events shorter than the time specified in the field to the right. This is useful if you have many short events, like spot effects, where only the start time is of any relevance.

Setting	Description
No leading zeroes	By default, the time positions of events will be listed in a syntax with “leading zeroes”. For example, if the display format is seconds, hours and minutes will be listed as “01”, “02” etc. If this is activated, the time column will not display the leading zeroes.
Merge events if gap is less or equal...	If events on a track are lined up end to end – i.e. there is no gap between them – they will be considered as a single event in the track sheet. By defining a value in this box, you can specify how large a gap between events has to be for them to be considered as separate events. If gaps between events are smaller than or equal to the value you specify, they will be listed as a single event. Otherwise they will be listed as separate events.
Name Filter	This allows you to filter out certain event names of your choice so that they are not displayed in the track sheet. Click in the text field and type in the name(s) – to enter several names, separate each with a semi-colon (;). Partial names are OK, so if you want to filter out the event name “Crossfade”, for example, you could just write “Cross”. However, this would filter out other events starting with the word cross as well – e.g. “Crosstalk” would also be filtered out.

Printing the track sheet

Printing is done using the standard procedures:

1. On the File Menu, select the “Page Setup...” option. The Page Setup dialog opens.
2. Make sure that the correct page size and page orientation are selected.
You may also want to make additional printer settings, following the standard Windows/Mac procedures.
3. Select “Print...” from the File menu.
Make the desired printer settings in the dialog that opens, and click OK. The track sheet is printed.

Introduction

The Export Audio Mixdown function in Nuendo allows you to mix down audio from the program to files on your hard disk in a number of formats. In the Channel Selection section, you can choose which channels (or busses) to export. By activating the “Channel Batch Export” option you can choose to mix down several channels in one go. For each channel, an individual file will be created.

The following channel types are available:

- **Output channels**

For example, if you have set up a stereo mix with tracks routed to a stereo output bus, mixing down that output bus will give you a mixdown file containing the whole mix. Similarly, you can mix down a complete surround bus, either to a single multi-channel file or to one file per surround channel (by activating the Split Channels option).

- **Audio track channels**

This will mix down the channels for the tracks, complete with insert effects, EQ, etc. This can be useful for turning a number of events into a single file, or to convert tracks with insert effects into audio files (that are less CPU-intensive). Simply export the track and re-import the file into the project.

- **Any kind of audio-related Mixer channel**

This includes VST instrument channels, instrument tracks, effect return channels (FX channel tracks), group channels, and ReWire channels. There are many uses for this – for example, you can mix down an effect return track or turn individual ReWire channels into audio files.

Please note the following:

- The Export Audio Mixdown function mixes down the area between the left and right locators or ranges defined by cycle markers.

- When you mix down, you get what you hear – mutes, Mixer settings, record enable, and insert effects are taken into account.

Note though that you will only include the sound of the channels you select for mixdown.

- **MIDI tracks are not included in the mixdown!**

To make a complete mixdown containing both MIDI and audio, you first need to record all your MIDI music onto audio tracks (by connecting the outputs of your MIDI instruments to your audio inputs and recording, as with any other sound source).

Mixing down to audio files

1. Set up the left and right locators to encompass the section you want to mix down.

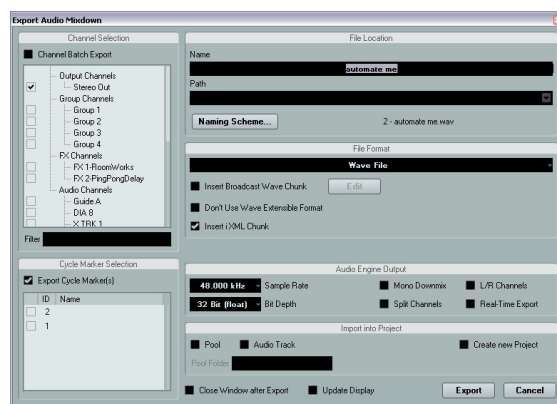
You can also set up a cycle marker accordingly.

2. Set up your tracks so that they play back the way you want.

This includes muting unwanted tracks or parts, making manual Mixer settings and/or activating the R (Read) automation buttons for some or all Mixer channels.

3. Pull down the File menu and select “Audio Mixdown...” from the Export submenu.

The Export Audio Mixdown dialog opens.



4. In the Channel Selection section to the left, select the channels you want to mix down. The list contains all output and audio-related channels available in the project (see [“About the Channel Selection section” on page 475](#)).

Activate the Channel Batch Export option if you want to mixdown several channels at once.

5. If you want to export a cycle marker range instead of the area between the left and right locators, activate the Export Cycle Marker(s) option and select the corresponding marker(s).

Only the cycle markers of the active track can be selected. On export, you get one audio file for each section defined by a cycle marker. Please keep in mind that working with channel batch export and cycle markers might lead to a high file number. For example, exporting five tracks and three cycle markers leads to 15 new audio files.

6. In the File Location section at the top you can set up the naming scheme for the exported files and select a path for the mixdown files.

For details about the naming options, see [“About the File Location section”](#) on [page 476](#).

7. Select an entry from the File Format pop-up menu and make additional settings for the file to be created.

This includes codec settings, meta data, sample rate, bit depth, etc. The available options depend on the selected file format, see [“The available file formats”](#) on [page 478](#).

8. In the Audio Engine Output section, specify whether you want to export all subchannels of a multi-channel bus as separate mono files (Split Channels), downmix all subchannels to one mono file (Mono Downmix), or export only the left and right channels of a multi-channel bus to a stereo file (L/R Channels).

For details about the settings relating to the audio engine, see [“About the Audio Engine Output section”](#) on [page 477](#).

9. Activate Realtime Export if you want the export to happen in realtime (see [“About the Audio Engine Output section”](#) on [page 477](#)).

10. If you want to automatically import the resulting audio files back into Nuendo, activate any of the checkboxes in the “Import into Project” section.

For details about the available options, see [“About the Import into Project section”](#) on [page 478](#).

11. If you activate Update Display, the meters will be updated during the export process.

This allows you to check for clipping, for example.

12. Click Export.

A dialog with a progress bar is displayed while the audio file or files are being created. To cancel the operation, you can click the Abort button.

- During the realtime export of a single channel, the Audition Volume fader is displayed in the progress dialog (see [“About the Audio Engine Output section”](#) on [page 477](#)). It allows you to adjust the Control Room volume.

Note that this fader is only available if the Control Room is activated.

- If the “Close Window after Export” option is activated, the dialog will be closed automatically.

- If you have activated any of the options in the “Import into Project” section, the mixdown file(s) will be imported back into the same or a new project.

When playing back the reimported file in the same Nuendo project, mute the original tracks so that you only hear the mixdown.

⚠ If you set the export range in such a way that the effects applied to a preceding event (e.g. reverb) reach into the next, these will be heard in the mixdown (even though the event itself is not included). If you do not want this, you need to mute the first event before exporting.

The Export Audio Mixdown dialog

Below you will find detailed descriptions of the different sections of the dialog and the corresponding functions.

About the Channel Selection section

The Channel Selection section shows all output and audio-related channels available in the project. These channels are organized in a hierarchical structure that allows you to easily identify and select the channels you want to export. The different channel types are listed below each other, with channels of the same type being grouped in a node (e.g. instrument tracks).

- You can activate/deactivate channels by clicking on the checkboxes in front of the channel names.

- If Channel Batch Export is activated, you can also activate/deactivate all channels of the same type by clicking on the checkbox in front of the channel type entry.

- If Channel Batch Export is activated, you can select/deselect several channels in one go using the [Shift] and/or [Ctrl]/[Command] modifiers and then clicking on any of the checkboxes for the highlighted channels.

Note that this toggles the activation status of a channel, i.e. all selected channels that were previously activated will be deactivated and viceversa.

- If your project contains a large number of channels, it might get difficult to find the desired channels in the Channel Selection section. To simplify the process of selecting several channels, you can filter the display. Simply type in the desired text (e.g. “voc” to show all tracks containing vocals) in the Filter field below the tree view.

About the Cycle Marker Selection section

If you have already setup cycle markers to organize your project (see “[Cycle markers](#)” on [page 137](#)), or if you want to export different subsections of a project in one go, it might be useful to define the export range based on cycle markers. This is done in the Cycle Marker Selection section at the bottom left of the window.

⚠ When using multiple marker tracks, this section always shows the cycle markers from the track that has the focus.

- To select the export range, activate the “Export Cycle Marker(s)” option and select the desired marker(s) from the list.

A checkmark in front of the marker ID indicates that a cycle marker is selected.

- If you have selected several cycle markers and click the Export button, the ranges defined by these markers are exported one after the other, starting with the topmost marker in the list.

⇒ If “Export Cycle Marker(s)” is activated, the Naming Scheme pop-up menu (see below) contains two more elements: Cycle Marker Name and Cycle Marker ID.

About the File Location section

In the File Location section you can specify a name and a path for the exported files. Furthermore, you can define the naming scheme for the exported files.

At the right of the Name and the Path fields there are two pop-up menus with a number of options:

Naming Options

- Select “Set to Project Name” to set the Name field to the project name.
- Activate the “Auto Update Name” option to add a number to the specified file name every time you click the Export button.

Path Options

- Select “Choose...” to open a dialog in which you can browse for a path and enter a file name.

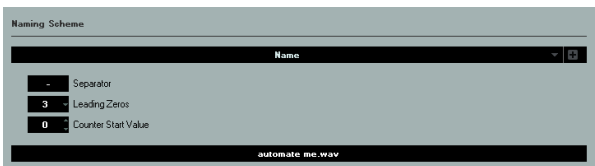
The file name will automatically be shown in the Name field.

- Select an entry from the Recent Paths section to reuse a path specified for a previous export.

This section is only shown after an export has been completed. With the “Clear Recent Paths” option you can delete all entries from the Recent Paths section.

- Activate the “Use Project Audio Folder” option to save the mixdown file in the project’s Audio folder.

Naming Scheme



Clicking the “Naming Scheme...” button opens a separate pop-up window. Here you can choose a number of elements that will be combined to form the file name. Depending on the settings in the Channel Selection and Marker Selection sections, the following elements are available: Name, Project Name, Mixer Index, Channel Type, Channel Name, and Counter, as well as Cycle Marker Name and Cycle Marker ID.

The elements are defined as follows:

Element	Description
Name	The name that you entered in the Name field (in the File Location section).
Mixer Index	The number of the Mixer channel.
Channel Type	The type of audio-related channel that is being exported.
Channel Name	The name of the exported channel.
Project Name	The name of the Nuendo project.
Counter	This is only available for batch export. Use this to include an incrementing number in the generated files names in order to create unique file names.
Cycle Marker Name	This is only available for cycle marker exports. This is the name as shown in the Marker window or the info line in the Project window.
Cycle Marker ID	This is only available for cycle marker exports. This is the ID as shown in the Project window and the Marker section of the Export Audio Mixdown dialog.

⇒ By combining the available naming elements, you can make sure that all the files of a batch are exported with unique names. If you have set up a naming scheme that would result in identical file names, a warning message appears when you click the Export button.

- To add an element, press the “+” button on the far right, and to remove an element from the naming scheme click the corresponding “-” button.
You can also remove an element by dragging it out of the Elements section.
- To rearrange the sequence, simply click on an element and drag it to a different position.

- To choose a different element for a certain position, click on the element name and select a new entry from the pop-up menu.
The elements can only be used once in a naming scheme. The pop-up menu therefore shows only those elements that are still available.

Below the Elements section you will find some additional options:

Option	Description
Separator	Allows you to enter any character sequence to be used as a separator between the naming elements (e.g. a hyphen enclosed in spaces).
Leading Zeros	This controls how many leading zeros the Counter and Mixer Index components will have. For example, if you set this to “2”, the numbers from 1 to 10 will be written as 001 to 010.
Counter Start Value	Here you can enter a number that is used as the first Counter value.

The field below these options shows a preview of what the resulting file names will look like. For example, if you set up the elements as follows:

<Project Name> - <Channel Name> - <Cycle Marker Name>

This could result in a file name such as the following:

Reel2 - Dialogue - Scene15.wav

⇒ To close the Naming Scheme pop-up window, simply click anywhere outside the pop-up window. The generated name will now also be shown to the right of the “Naming Scheme...” button.

About the File Format section

In the File Format section, you can select the file format for your mixdown files and make additional settings that are different for each file type. For details, see [“The available file formats”](#) on [page 478](#).

About the Audio Engine Output section

The Audio Engine Output section contains all the settings related to the output of the Nuendo audio engine. The following options are available:

Option	Description
Sample Rate (uncompressed file formats only)	This setting determines the frequency range of the exported audio – the lower the sample rate, the lower the highest audible frequency in the audio. In most cases, you should select the sample rate set for the project, since a lower sample rate will degrade the audio quality (mainly reducing the high frequency content) and a higher sample rate will only increase the file size, without adding to audio quality. Also consider the future usage of the file: If you plan to import the file into another application, for example, you should select a sample rate supported by that application. If you are making a mixdown for CD burning, you should select 44.100kHz, since this is the sample rate used on audio CDs.
Bit Depth (uncompressed file formats only)	Allows you to select 8, 16, 24 bit or 32 bit (float) files. If the file is an “intermediate mixdown” that you plan to re-import and continue working on in Nuendo, we recommend that you select the 32 bit (float) option. 32 bit (float) is a very high resolution (the same resolution as used internally for audio processing in Nuendo), and the audio files will be twice the size of 16 bit files. If you are making a mixdown for CD burning, use the 16 bit option, as CD audio is always 16 bit. In this case, we recommend that you activate the UV-22HR dithering plug-in (see the separate PDF document “Plug-in Reference” for details). This reduces the effects of quantization noise and artifacts from being introduced when converting the audio down to 16 bit. 8 bit resolution should only be used if required, since it results in limited audio quality. 8 bit audio may be suitable in some multimedia applications, etc.
Mono Downmix	Activate this if you want to downmix all the subchannels of a stereo or surround channel or bus to a single mono file. To avoid clipping, the following summing rules are applies: Stereo: The panning law as defined in the Project Setup dialog is applied (see “About the “Stereo Pan Law” setting” on page 162). Surround: The channels are summed and then divided through the number of channels used (in case of a 5.1. channel = (L+R+C+Lfe+Ls+Rs)/6).
Split Channels	Activate this if you want to export all subchannels of a multi-channel bus as separate mono files.

Option	Description
L/R Channels	Activate this if you want to export only the left and right subchannels of a multi-channel bus into a stereo file.
Realtime Export	<p>Activate this if you want the export to happen in realtime, in which case the process will take at least the same time as regular playback.</p> <p>Some VST plug-ins, external instruments and effects require this in order to have enough time to update correctly during the mixdown – consult the plug-in manufacturers if uncertain.</p> <p>When Realtime Export is activated, the exported audio will be played back via the Control Room. Depending on the CPU and disk speed of your computer, it may not be possible to export all channels simultaneously if Realtime Export is activated. If an error occurs during the realtime export, the program will automatically stop the process, reduce the number of channels and start again. Afterwards the next batch of files is exported. This is repeated as often as needed to export all selected channels.</p> <p>Due to this splitting of the export process in “runs”, the realtime export might take longer than the actual playback would.</p>

About the Import into Project section

In this section you will find several options for importing the resulting mixdown files back into the existing or into a new project:

- If you activate the Pool checkbox, the resulting audio file will automatically be imported back into the Pool as a clip. Use the Pool Folder option to specify in which Pool folder the clip will reside.

- If you activate the Audio Track option as well, an audio event that plays the clip will be created and placed on a new audio track, starting at the left locator. If you activate the Audio Track, the Pool option will automatically be activated as well, and deactivating the Pool option also deactivates the Audio Track option.

- If you activate the “Create New Project” option, a new project is created that contains one audio track for each of the exported channels, as well as the signature and tempo track of the original project. Note that if this is activated, the Pool and Audio Track options are disabled. The tracks will have the corresponding mixdown file as audio event. The track names will be identical with the export channel names. Note that the new project will be the active project.

⇒ The Create New Project option is only available if you have selected an uncompressed file format and the Use Project Audio Folder option is deactivated.

About the Import Options dialog

If you activate any of the options in the “Import into Project” section, the Import Options dialog will open for each exported channel when the export is complete. For a detailed description of the options in this dialog see [“About the Import Medium dialog”](#) on page 329.

The available file formats

The following pages describe the different export file formats, as well as their options and settings.

- AIFF files (see [“AIFF files”](#) on page 478).
- AIFC files (see [“AIFC files”](#) on page 479).
- Wave files (see [“Wave files”](#) on page 479).
- Wave 64 files (see [“Wave 64 files”](#) on page 479).
- Broadcast Wave files (see [“Broadcast Wave files”](#) on page 479).
- MP3 files (see [“MPEG 1 Layer 3 files”](#) on page 479).
- Ogg Vorbis files (see [“Ogg Vorbis files”](#) on page 480).
- Windows Media Audio Pro files (Windows only, see [“Windows Media Audio Pro files \(Windows only\)”](#) on page 480).

⚠ Note that the Wave 64 file format is the only format that allows you to export files with a resulting size of more than 2 GB.

⇒ Most of the settings described below for AIFF files are available for all file types. Where this is not the case, you will find additional information in the corresponding section.

AIFF files

AIFF stands for Audio Interchange File Format, a standard defined by Apple Inc. AIFF files have the extension “.aif” and are used on most computer platforms.

For AIFF files the following options are available:

Option	Description
Insert Broadcast Wave Chunk	<p>This allows you to include information about the date and time of creation, a timecode position (allowing you to insert exported audio at the correct position in other projects, etc.) along with author, description and reference text strings in the exported file.</p> <p>Some applications may not be able to handle files with embedded info – if you get problems using the file in another application, deactivate the option and re-export.</p>

Option	Description
Edit button	By clicking this button the "Broadcast Wave Chunk" dialog opens where you can enter additional information that will be embedded in the exported files. Note that in the Preferences dialog (Record–Audio–Broadcast Wave page) you can enter default text strings for author, description and reference that will automatically be displayed in the "Broadcast Wave Chunk" dialog.
Insert iXML chunk	This allows you to include additional project-related metadata (e.g. project name, author and project frame rate) in the exported file. Some applications may not be able to handle files with embedded info – if you get problems using the file in another application, deactivate the option and re-export. Note: In the Project Setup dialog you will find the fields Author and Company that you can use to include the corresponding data in the iXML chunk. These fields are also available in the Preferences dialog (General–Personalization page).

AIFC files

AIFC stands for Audio Interchange File Format Compressed, a standard defined by Apple Inc. These files support compression ratios as high as 6:1 and contain tags in the header. AIFC files have the extension ".aifc" and are used on most computer platforms.

AIFC files support the same options as AIFF files.

Wave files

Wave files have the extension ".wav" and are the most common file format on the PC platform.

Wave files support the same options as AIFF files and have one additional option:

- Don't Use Wave Extensible Format

The Wave Extensible format contains additional metadata, such as the speaker configuration. It is an extension to the normal Wave format that some applications may not be able to handle.

If you get problems using the Wave file in another application, activate this option and re-export.

Wave 64 files

Wave 64 is a proprietary format developed by Sonic Foundry Inc. In terms of audio quality, Wave 64 files are identical to standard Wave files, but in the file headers Wave 64 files use 64-bit values for addressing where Wave files use 32-bit values. The consequence of this is

that Wave 64 files can be considerably larger than standard Wave files. Wave 64 is therefore a good file format choice for really long recordings (file sizes over 2GB), e.g. live surround recordings. Wave 64 files have the extension ".w64".

Wave 64 files support the same options as AIFF files.

Broadcast Wave files

Concerning audio, Broadcast Wave files are the same as regular Wave or Wave 64 files, but with additional meta data. To create a Broadcast Wave file, select either Wave or Wave 64 as the file format and activate the Insert Broadcast Wave Chunk option. Click Edit if you wish to edit the chunk information, otherwise the defaults as specified in the Preferences dialog (Record–Audio–Broadcast Wave page) will be used. Broadcast Wave files have the extension ".wav".

Broadcast Wave files support the same options as regular Wave files.

MPEG 1 Layer 3 files

MPEG 1 Layer 3 files have the extension ".mp3". By use of advanced audio compression algorithms, MP3 files can be made very small, yet maintaining good audio quality.

In the File Format section, the following options are available for MPEG 1 Layer 3 files:

Option	Description
Bit Rate fader	By moving this fader, you can select a bit rate for the MP3 file. As a rule, the higher the bit rate, the better the audio quality and the larger the file. For stereo audio, 128kBit/s is often considered to result in "good" audio quality.
Sample Rate pop-up menu	On this pop-up menu you can select a Sample Rate for the MP3 file.
High Quality Mode option	When this is activated, the encoder will use a different resampling mode, which can give better results depending on your settings. In this mode, you cannot specify the Sample Rate, but only the Bit Rate for the MP3 file.
Insert ID3 Tag option	This allows you to include ID3 Tag information in the exported file.
Edit ID3 Tag button	When you click this, the ID3 Tag dialog opens, in which you can enter information about the file. This additional information will be embedded as text strings in the file, and can be displayed by most mp3 playback applications.

Ogg Vorbis files

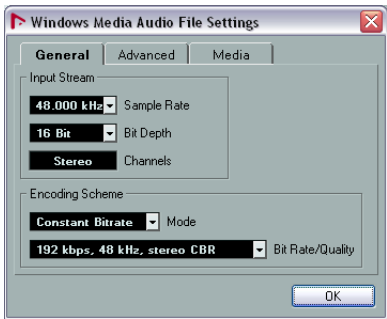
Ogg Vorbis is an open source, patent-free audio encoding and streaming technology, offering compressed audio files (extension “.ogg”) of small size, but with comparatively high audio quality.

In the File Format section you will find only one setting: the Quality fader. The Ogg Vorbis encoder uses variable bit rate encoding, and the Quality setting determines between which limits the bit rate will vary. Generally speaking, the higher the Quality setting, the higher the sound quality but also the larger the files.

Windows Media Audio Pro files (Windows only)

This is a continuation of the Windows Media Audio format developed by Microsoft Inc. Due to the advanced audio codecs and lossless compression used, WMA Pro files can be decreased in size with no loss of audio quality. Furthermore, WMA Pro features the possibility of mixing down to 5.1 surround sound. The files have the extension “.wma”.

When you select “Windows Media Audio File” as the file format, you can click the “Codec Settings...” button to open the “Windows Media Audio File Settings” window.



Note that the configuration options may vary, depending on the chosen output channel(s).

General tab

In the Input Stream section, you set the sample rate (44.1, 48 or 96 kHz) and the bit resolution (16 bit or 24 bit) of the encoded file. Set these to match the sample rate and bit resolution of the source material. If no value matches that

of your source material, use the closest available value that is higher than the actual value. For example, if you're using 20 bit source material, set the bit resolution to 24 bit rather than 16 bit.

⇒ The setting in the Channels field depends on the chosen output and cannot be changed manually.

The settings in the Encoding Scheme section are used for defining the desired output from the encoder, e.g. a stereo or a 5.1 surround file. Make settings appropriate for the intended use of the file. If the file will be downloaded or streamed on the Internet, you might not want too high bit rates, for example. See below for descriptions of the options.

Mode

The WMA Pro encoder can use either a constant bit rate or a variable bit rate for encoding to 5.1 surround, or it can use lossless encoding for encoding to stereo. The options on this menu are as follows:

Mode	Description
Constant Bitrate	This will encode to a 5.1 surround file with a constant bit rate (set in the Bit Rate/Channels menu, see below). Constant bit rate is preferably used if you want to limit the size of the final file. The size of a file encoded with a constant bit rate is always the bit rate times the duration of the file.
Variable Bitrate	Encodes to a 5.1 surround file with a variable bit rate, according to a quality scale (the desired quality is set in the Bit Rate/Quality menu, see below). When you encode with variable bit rates, the bit rate fluctuates depending on the character and intricacy of the material being encoded. The more complex passages in the source material, the higher the bit rate – and the larger the final file.
Lossless	Encodes to a stereo file with lossless compression.

Bit Rate/Quality

This menu allows you to set the desired bit rate. The available bit rate settings vary depending on the selected mode and/or output channels (see above). If the Variable Bitrate mode is used, the menu allows you to select from various levels of quality, with 10 being the lowest and 100 the highest. Generally, the higher the bitrate or quality you select, the larger the final file will be. The menu also shows the channel format (5.1 or stereo).

Advanced tab

▪ Dynamic Range Control

These controls allow you to define the dynamic range of the encoded file. The dynamic range is the difference in dB between the average loudness and the peak audio level (the loudest sounds) of the audio. These settings affect how the audio is reproduced if the file is played on a Windows computer with a player from the Windows Media series, and the “Quiet Mode” feature of the player is activated to control the dynamic range.

The dynamic range is automatically calculated during the encoding process, but you can specify it manually as well.

To manually specify the dynamic range, first put a checkmark in the box to the left by clicking in it, and then enter the desired dB values in the Peak and Average fields. You can enter any value between 0 and -90dB. Note, however, that it is usually not recommended to change the Average value, since this affects the overall volume level of the audio and therefore can have a negative effect on the audio quality.

The Quiet Mode in a Windows Media player can be set to one of three settings. Below, these settings are listed together with an explanation of how the Dynamic Range settings affect them:

- Off: If Quiet Mode is off, the dynamic range settings that were automatically calculated during the encoding will be used.
- Little Difference: If this is selected and you have not manually changed the dynamic range settings, the peak level will be limited to 6dB above the average level during playback. If you have manually specified the dynamic range, the peak level will be limited to the mean value between the peak and average values you specified.
- Medium Difference: If this is selected and you have not manually changed the dynamic range settings, the peak level will be limited to 12dB above the average level. If you have changed the dynamic range, the peak level will be limited to the peak value you specified.
- Surround Reduction Coefficients

Here you can specify which amount of volume reduction, if any, is applied to the different channels in a surround encoding. These settings affect how the audio is reproduced on a system incapable of playing back the file in surround, in which case the surround channels of the file will be combined into two channels and played back in stereo instead.

The default values should produce satisfactory results, but you can change the values manually if you wish. You can enter any value between 0 and -144 dB for the surround channels, the center channel, the left and right channels and the LFE channel, respectively.

Media tab

In these fields you can enter a number of text strings with information about the file – title, author, copyright information and a description of its contents. This information will then be embedded in the file header and can be displayed by some Windows Media Audio playback applications.

⇒ For more information about surround sound and encoding, see the chapter “[Surround sound](#)” on [page 226](#).

37

Networking

Introduction

This chapter describes how you can use Nuendo's networking technology to collaborate with other users of Nuendo in a peer-to-peer network.

The "owner" of a project can share it with any number of users via LAN (Local Area Network) connections and/or WAN (Wide Area Network) connections via standard network protocols.

This allows several separate users to work on a project simultaneously and coordinate their efforts, as well as exchange ideas and suggestions.

Using Nuendo to collaborate in a network requires that:


- All users have the same version of Nuendo.
- All computers are either connected via LAN or via the Internet through IP addresses.

What can I use the Networking functions for?

The networking technology in Nuendo allows collaboration with, and exchange of, MIDI, video, and audio data – i.e. it is possible to exchange and edit MIDI, video, and audio. Marker tracks and instrument tracks are also included in a shared project. As of this writing, it is not possible to exchange any Mixer settings.

Even though the networking technology allows for collaboration via WAN connections over the Internet, it is primarily designed for use in a LAN workgroup. It can also be used for collaboration over the Internet (see below).

Sound Designer II and Networking

 Please note that using Sound Designer II (SD2) files in projects shared over a network may lead to unpredictable results, and is not recommended.

Networking protocol and ports

In addition to TCP/IP, the Nuendo networking technology uses the standard network protocol UDP (User Datagram Protocol - primarily used to broadcast messages over a network).

Since the technology uses the standard protocols and calls of the operating system, no special hardware or drivers are required to use it, aside from a working NIC card.

Nuendo uses three ports in your system for establishing communication, broadcasting messages and transferring data between users: UDP port 6990, TCP port 6991 and TCP port 6992. These ports need to be open for network communication to be possible.

Considerations for Internet use

As previously mentioned, the Nuendo networking functions are designed mainly for use in local area networks, but it is also possible to use them over the Internet.

In this case, there are a few things to keep in mind and some system settings you may need to make:

- If a network is to be created with any users connected via the Internet, all users need to know the respective IP addresses of the other computers in the network, and use these to establish the connection.

See "[Setting up WAN connections](#)" on [page 485](#) for details about how to use the IP address of a computer to establish network communication with it in Nuendo.

- There may also be issues that need to be resolved regarding firewalls and/or computers connected to the Internet via private subnets.

If your computer is behind a firewall

In a LAN, Nuendo uses the UDP port 6990 to establish communication with the other computers. Over the Internet however, Nuendo does not use this port. Instead, connection and communication is established and handled via TCP/IP messages sent to the TCP ports 6991 and 6992.

This means that the TCP ports 6991 and 6992 must be open on all computers. Firewalls may block messages to these ports, thus making connection impossible. Consult the documentation for your firewall (or operating system) for information about how to open ports – or contact your network administrator.

If your computer is in a subnet that uses NAT

If your computer resides in a subnet that uses NAT (Network Address Translation), all computers in the subnet share the same external IP address, while the individual computers in the subnet have internal IP addresses.

In this case, you must set up a port mapping from the external ports 6991 and 6992 to your internal ports 6991 and 6992 - i.e. the actual ports on your computer, as opposed to the ports of the subnet.

If computers are in different NAT subnets

If you want to collaborate with users whose computers reside in different subnets that use NAT (see above), it might be a good solution to set up a VPN (Virtual Private Network). A VPN allows secure communication between networks, using the Internet for transferring data.

It is beyond the scope of this document to go into any details on how to set up a VPN, but make sure that your VPN will act as a single network and that the ports 6991, 6992, and, if possible, 6990 are open.

The network dialogs

The following sections give you a short overview of the network dialogs and their use:

Project Sharing and Permissions

Open this dialog, if you want to specify the user permissions for the active project before sharing it, either on a project basis, a track basis or both.

Shared Projects

Open this dialog, if you want a list of all identified users and shared projects in the network. This allows you to share your own projects as well as join projects shared by other users. Furthermore, the dialog offers the possibility of connecting to WAN (Wide Area Network) users.

User Manager

Open this dialog, if you want to set up lists of users, define their read and write permissions and save the settings as a permission preset. The presets can then be loaded in the "Project Sharing and Permissions" dialog, letting you share a project with the settings of the permission preset.

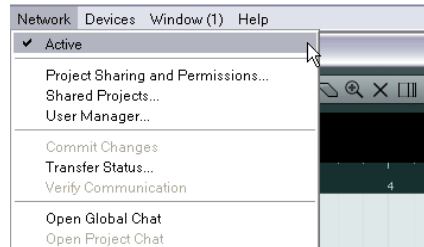
Selecting a user name

When your computer meets the criteria for communicating with other computers (see above), this is how you quickly go about establishing network communication and share a project with others:

1. Launch Nuendo.

2. Activate the network by opening the Network menu and activating the "Active" option.

This establishes network communication and introduces your computer to any computers already present in the network. Your computer now needs to have a unique ID for identification (see below).



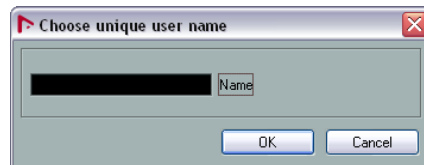
3. A dialog opens where you can enter a unique user name to identify your computer in the network.

This is the name that will be displayed in all the network dialogs to identify you to the other users in a network.

⚠ Each user in a network must specify a user name, or network name, in order to be identified in the network. You can also change the name later (see ["Selecting a user name – alternative method"](#) on [page 485](#)).

4. Click Yes to enter your user name.

A dialog opens where you can enter your user name.



▪ If you do not enter a user name at this point, the network will not be activated.

5. Click in the text field, type in a name of your choice and click OK.

If the network has already been created, the original creator – or administrator – may have already decided on user names for all participants. If so, ask the administrator for yours and enter it. For more information about selecting user names for other participants, see “[Creating a permission preset](#)” on [page 487](#).

⇒ If a name you enter is already in use on another computer in the network, you will be prompted to select another name.

When you have entered a user name, you can load or create a project that you want to share with the other users.

6. Click the “Share Project” option in the toolbar, or open the “Project Sharing and Permissions” dialog from the Network menu and activate the “Share Project” option. The project is now shared and all other users have full access to it. See “[Sharing projects](#)” on [page 487](#) for more details about sharing projects and what you can do in this dialog.

Selecting a user name – alternative method

If you did not specify a user name or if you need to change it, proceed as follows:

1. Open either the User Manager dialog or the Shared Projects dialog from the Network menu. In the top left corner of both dialogs you will find the Network Name text field.



Entering a network name in the User Manager dialog and in the Shared Projects dialog.

2. Click in the text field, type in a name of your choice and press [Return].

This is the name that will be displayed in all the network dialogs to identify you to the other users in a network.

⚠ The following user names “Guest”, “Administrator”, “Admin” and “Anonymous” are reserved and cannot be used.

Once you have entered a user name and this has been established in the network, it should not be changed unless absolutely necessary! To use an analogy, this is similar to registering for an Internet service or discussion forum – once you have registered under a specific name, you cannot log in under another name, unless you create a new account.

Setting up a network

The following is a description of how to set up a network with both LAN and WAN connections.

- For LAN connections, all computers must be part of the same network and communicate properly.
- For WAN connections, all computers must have a working Internet connection and a public IP address.

If your intended network meets these criteria, proceed as follows.

Setting up LAN connections

If you want to connect to other users via a LAN, you only have to make sure that all computers actually use the same LAN, that they are communicating properly via the TCP/IP protocol, and that you have activated the network by checking the “Active” item on the Network menu. If the computers are unable to communicate, contact your network administrator, or consult the network documentation for your operating system.

Setting up WAN connections

If you want to connect to other users over the Internet, you have to open a WAN connection to each. This requires that all users have a working Internet connection and a public IP address (see “[Considerations for Internet use](#)” on [page 483](#)).

WAN connections are set up in the Shared Projects dialog in the following way:

1. Make sure the “Active” item on the Network menu is checked. This initiates network communication with the other participants.
2. Open the Shared Projects dialog from the Network menu.

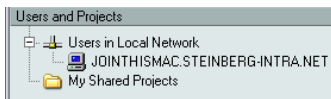
3. Click the “Add WAN Connection” button in the toolbar. A dialog opens, requesting the Domain Name or the IP address of the computer you want to connect to.



The “Add WAN Connection” button

4. Type in the IP address/Domain Name of the computer you want to connect to and click OK.

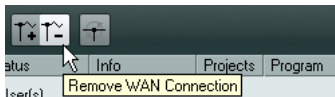
An item called “Global IP Network” now appears in the dialog. This lists either the IP address of the computer to which you have connected, or the domain name of its Internet service provider.



5. Repeat this procedure for every user you want to connect to over the Internet.

⇒ If a computer is dynamically allocated an IP address by its Internet service provider – as opposed to having a permanent IP address – you will have to repeat the above procedure each time the computer receives a new IP address!

- You can remove a WAN connection by selecting it and clicking the “Remove WAN Connection” button.



The “Remove WAN Connection” button

- You can remove the entire “Global IP Network” item by selecting it and pressing [Delete] or [Backspace]. This will also remove any existing WAN connections.

Should you be unable to establish a WAN connection, first verify that you entered the IP address correctly. Connection problems may also occur for the following reasons:

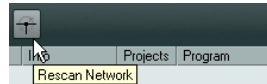
- Your computer and/or the computer you’re trying to connect to is protected by a firewall.
- Your computer and/or the computer you’re trying to connect to does not have the necessary ports open.

For information about communication via the Internet, see “Considerations for Internet use” on page 483.

Updating the network information

If all users in a network are online and have entered user names (see “Selecting a user name” on page 484), you can do the following to update the network information in Nuendo:

- Open the Shared Projects dialog and click the “Rescan Network” button to update the network information.



At this point, the following will happen:

- The item “Users in Local Network” is updated to display a list of all the online users connected via LAN, along with their user names.
- The item “Global IP Network” is updated to display a list of all the online users connected via WAN, along with their user names.

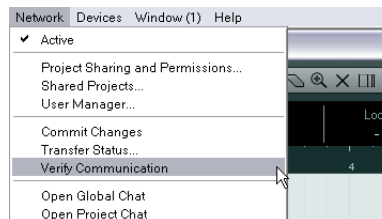
If the user list is not updated as it should, this is probably because the computers in the network are not communicating properly.

⇒ Information about users that are offline will not be updated.

Verify Communication

Whenever project information needs to be updated over the network, Nuendo will first check if the connection with all project participants is still working. This check is performed in the background with a preset timeout period.

When participants do not respond within this timeout period, a “Commit Failed” message is displayed. At this stage, no further action is performed, as the problem might be temporary (e.g. Laptop unplugged). If the problem persists, however, you can call the “Verify Communication” function via the Network menu.

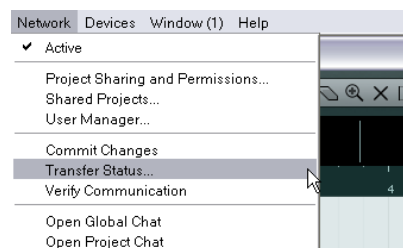


When this function is called, a dialog shows the progress of the checking process.

- When all project participants are found, a dialog lists all project participants and their response times (i.e. the time it took for their computers to respond to the check). If the response times were longer than the standard timeout, or if a participant was not found who you know is in fact online and waiting for network information, you may want to click on “Adjust timer”. This will change the timeout threshold in Nuendo to a longer setting, allowing for participants with slower response times to be found.
- If project participants are not found because they are offline, a dialog will be shown allowing you to remove these users from the workgroup.

Transfer Status

Transfer of network data always is performed in the background. If you want to check on the progress of your transfer processes, you can open the Transfer Status window by pulling down the Network menu and selecting “Transfer Status...”.



As you upload or download project data, the Transfer Status window displays progress bars for every track in the project. The Transfer Status window features Cancel buttons for each of the transfer operations. Use these to stop any transfer operation.

Sharing projects

When you want to share a project with others, you first decide which users you want to have access to the project, and then specify their read and write permissions.

To set up a list of users and their read and write permissions choose one of the following methods:

- Create a permission preset containing all the settings. Storing permission presets is practical since they let you apply the same list of users and their permissions to future projects.
- Set up users and their permissions manually for each project. This method also allows you to specify permissions for separate tracks in a project, as opposed to the entire project.
- Load the default permissions to let all the participants in a network have access to a project.

See [“About the Default Permissions preset and the Guest user”](#) on [page 488](#) for more information.

We will first describe all of these methods here, and then proceed to describe how you go about sharing a project.

Creating a permission preset

In the User Manager dialog, read and write permission settings for users can be stored in permission presets. These can then be applied to other projects, i.e. the users will automatically get read and write permissions according to the settings stored in the permission preset.

- Read permission allows users to view and play back shared projects or tracks but not make any changes to them.
- Write permission allows users to make any changes to shared projects or tracks. It is not possible to have write permission without also having read permission.

Proceed as follows to create a permission preset:

1. From the Network menu open the User Manager dialog. This is described in detail in the section [“User Manager”](#) on [page 484](#).
2. Below the “Permission Presets” column click the plus sign. A dialog for the naming of the new permission preset opens.

3. Type in the desired name and click OK.
The permission preset is created and added to the list.



The “User Pool” column to the right lists all the users who have entered a user name, and who have been online and established in the network at some point (note that users do not have to be online to be listed here).

However, there may also be instances when you want to add a user who is offline and has not been established in the network. If this is the case, the user is not available in the User Pool list, but you can still add him to a permission preset in the following way:

4. Below the “User Pool” column click the plus sign.

A user with a generic name – “User #” – is added to the list.

5. Type in the desired name.

The user you’re adding may have decided on a user name and entered it, as described in [“Selecting a user name – alternative method”](#) on [page 485](#), but has been offline and therefore not yet established in the network. In this case, you can enter that name if you know it. Otherwise, enter a name of your own choice and later let the user know which name to use.



The next step is to add users to the permission preset.

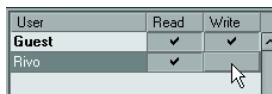
6. Make sure the preset is selected in the “Permission Presets” column.
7. In the “User Pool” column, select the user(s) you want to add to the permission preset.
To select several users, hold down [Shift] or [Ctrl]/[Command] and click on the user names.
8. When you have selected the user(s) you want to add, click the Arrow symbol to the left of the “User Pool” column. The users you selected will now be added to the “User” column in the middle of the dialog.

The next thing to do is to define the read and write permissions for the added users. In the Read and Write columns, the read and write permissions for each user can be specified. By default each added user has both read and write permission.

9. If you do not want a user to have read or write permission, click the corresponding column to deactivate the permissions.

⇒ Having write permission automatically means to also have read permission.

When you have added the desired users and specified their read and write permissions, the preset is complete. The permission preset will now be available for use, see also [“Loading a permission preset”](#) on [page 490](#).



Permission presets apply to entire projects – i.e. when a permission preset is loaded, the read and write permission settings in it are valid for the entire project. However, you can also specify separate permissions for each track, see [“Setting up permissions for separate tracks”](#) on [page 489](#).

⇒ It is also possible to create a permission preset in the Project Sharing and Permissions dialog, see [“Saving the settings as a permission preset”](#) on [page 489](#).

Removing permission presets and users

Below each column to the right is a Remove button (the trash icon). You can remove one or several permission preset(s) or user(s) (including the “Guest” user – see below) from the respective columns by selecting them and clicking this icon.

About the Default Permissions preset and the Guest user

The “Default Permissions” preset cannot be removed. You can use it either as is, or you can modify it as you wish by adding and removing users. By default, it contains one user – “Guest” – with both read and write permission.

- If “Guest” is added to a permission preset, anyone in the network can utilize the Guest permissions.
Therefore, if you share a project that has Guest as a user, anyone in the network can join it with the corresponding permissions.

⇒ If you want to share a project with everyone in a network and let everyone have both read and write permission for the entire project, the easiest and quickest way to do this is to use the Default Permissions preset as is.

Setting up users and permissions manually

Instead of creating a permission preset in the User Manager dialog, you can use the “Project Sharing and Permissions” dialog to manually set up which users should be allowed to share a project, and what read and write permissions they should have.

⇒ It is not possible to add users who have not yet been established in the network (see [“Creating a permission preset”](#) on [page 487](#)). If this is what you want, use the “User Manager” dialog.

Proceed as follows:

1. Open the “Project Sharing and Permissions” dialog from the Network menu.

2. In the “All Users” column to the right, select the user(s) you want to share the project with.

All users in the network that have entered user names and are established in the network are listed, along with the default “Guest” user. To select several users, hold down [Shift] or [Ctrl]/[Command] and click on the user names.

3. Click the Add User to Permission List button above the column (the left button).

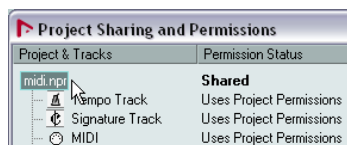
The selected users are added to the “User Name” column above the “All Users” column.

- To remove a user, select the user name in the “User Name” column and click the Delete User button below the column (the right button).

The user is removed from the “User Name” column. You can remove several users at once. You should remove the “Guest” user if you do not want everyone in the network to have full access to the project.

4. In the “Project & Tracks” column, make sure the top item (the project name) is selected.

This way, the settings you make affect the entire project, rather than separate tracks.



5. Define the project read and write permissions for the added users, by checking and unchecking the Read and Write permission columns (“r”, “w”) as desired.

Note that having write permission automatically means also having read permission.

These settings are valid for the entire project. If you want to specify read and write permissions separately for each track, see [“Setting up permissions for separate tracks”](#) on [page 489](#).

Saving the settings as a permission preset

If you have manually added users and set up their read and write permissions for the project in the “Project Sharing and Permissions” dialog, you can create a permission preset based on the settings you have made:

1. Click the plus sign to the left of the “Permission Presets” menu in the bottom right corner.

A dialog opens, allowing you to enter a name for the permission preset.

2. Type in the desired name and click OK.

The permission preset is saved and added to the menu.

You can now also access this preset in the “User Manager” dialog, as described in the section [“Creating a permission preset”](#) on [page 487](#).

Setting up permissions for separate tracks

The “Project Sharing and Permissions” dialog also offers the possibility of specifying read and write permissions separately for each track in the project.

Proceed as follows:

1. In the “Projects & Tracks” column, select the track(s) for which you want to make separate settings.

As you can see, the right part of the dialog now only contains a checkbox and the text “Override Project Permissions”.



2. Activate the “Override Project Permissions” option.

3. Add users and specify their read and write permissions for the track(s) as described in the section [“Setting up users and permissions manually”](#) on [page 489](#).

4. When you are done, select the top item (the project name) in the “Project & Tracks” column again.

Permission settings for separate tracks are not saved in a permission preset, but you can first load a preset with the project permissions (see [“Loading a permission preset”](#) on [page 490](#)) and then make settings for separate tracks.

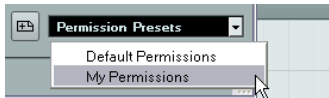
- To make separate track permissions in the project Inspector, select a track in the track list, open the Network section in the Inspector and click the “Override Project Permissions” button (the key symbol).
This makes it possible to make read and write permission settings for the track directly in the Inspector.



Loading a permission preset

To load a permission preset for the active project, proceed as follows:

1. Open the “Project Sharing and Permissions” dialog from the Network menu.
2. In the bottom right corner of the dialog, click in the Permission Presets text box to open a pop-up menu. The menu lists all available permission presets.



3. From the menu, select the permission preset you wish to use.

The users defined in the permission preset are now listed in the User Name column, and their read and write permissions are displayed.

You can now either use the settings of the loaded permission preset as they are for the shared project, or you can make manual adjustments on a project or track basis (see [“Setting up users and permissions manually”](#) on [page 489](#)).

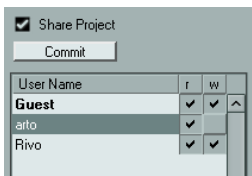
Sharing a project

Once you have set up all the users and their permissions – i.e. loaded a permission preset and/or manually added users and specified their permissions for this particular project – you can share the project.

Using the “Project Sharing and Permissions” dialog

1. If it is not already active, activate the network by checking the “Active” option on the Network menu.
2. Open the “Project Sharing and Permissions” dialog from the Network menu.
3. Activate the “Share Project” option.

The project is now shared and available to the users you have specified.



- To revoke sharing of the project, deactivate the “Share Project” option.

You can at any time make changes in this dialog, i.e. add or remove users and change permissions, and then update the shared project accordingly for all users by making the desired changes and clicking the “Commit” button.

Quick Sharing

If you just want to share a project with full read and write access for every user in the network without loading any permission preset or manually setting up users, the easiest way to do this is to click the “Share Project” button on the Project window toolbar (or activating “Share Project” in the “Project Sharing and Permissions” dialog).

This is provided you have not made any changes to the “Default Permissions” preset. The reason is that the default permissions (with only the user “Guest”) grant all users full access (see [“About the Default Permissions preset and the Guest user”](#) on [page 488](#)).

In the “Shared Projects” dialog

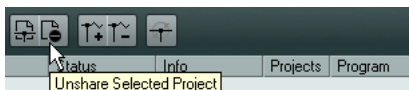
1. If it is not already active, activate the network by checking the option “Active” on the Network menu.
2. Open the “Shared Projects” dialog from the Network menu.
3. Click the “Share Active Project” button.

This will open the “Project Sharing and Permissions” dialog, to let you verify that all permissions are OK before sharing. You can then share the project in the dialog. When the active project is shared, it appears in the “My Shared Projects” folder.



The “Share Active Project” button

- To revoke sharing of a project, select it in the “My Shared Projects” folder and click the “Unshare Selected Project” button.

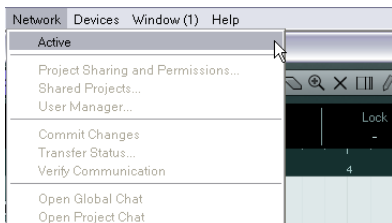


The “Unshare Selected Project” button

Deactivating a shared project

If you are sharing a project and want to stop working on it, you do this by deactivating the network. When you deactivate the network during work with a shared project, the other users will be disconnected from it. However, sharing will not be revoked unless you specify it – meaning that the next time you connect to the network, the project will still be shared, allowing the other users to join it without you having to make permission settings and share it all over again.

1. To deactivate the network, pull down the Network menu and select “Active”, so that the checkmark is removed.



2. A dialog opens, asking you to confirm that you want to disconnect the network.

All the users will be disconnected from the project. The project will still be shared when you connect to the network again.

- To reactivate the network, check the “Active” option on the Network menu again.

A dialog opens, asking you to confirm that you want to reconnect the network. All the users with whom you previously shared the project will now be able to join it again.

About the project folder

When you’re sharing a project, you have to decide whether the project folder for it should be located on your local hard disk, or – if you’re sharing the project over a LAN and have access to a common file server – if it should be located on the server.

You should consider the following:

- If the project folder is located on your hard disk, the files it contains will be copied to the other users’ hard disks, and their project folders.

This way, work on the files will be done locally on the computer of each user, and the updated files are then copied to the hard disks of the other users.

- If you have access to a file server and place the project folder and its contents on it, the other users can specify this folder as the project folder when they join the project. In this case, the project files will not be copied to the other users’ hard disks, but are instead accessed directly on the server. Working on the files directly on a server may be slower compared to working on them locally. On the other hand, the files will not have to be copied to each hard disk every time they are updated.

Where to put large media files

If you have a file server that is fast enough for connected workstations to call audio or video playback of files stored on this server, you should place large media files on this server to avoid excessive network traffic.

However, when you are using a Windows workstation, note that when you connect your file server using a drive letter (e.g. V:), Nuendo will treat this server as a local drive, which means that any data from this server used in a shared project will always be copied over the Nuendo network.

Therefore, try placing your large files on a file server and import them into Nuendo without using the “Copy File to Working Directory” option. The server path should now be displayed in the Pool.

Joining projects

The “Shared Projects” dialog lets you join projects shared by other users in the network.

This dialog lists all the established users in the network, and any projects they are sharing. For you to be able to join a project, the user sharing it must be online and have given you read and/or write access.

To join a project, proceed as follows:

1. Connect to the network by checking the “Active” option on the Network menu.
2. Open the “Shared Projects” dialog from the Network menu.
3. If necessary, click the “Rescan Network” button (the rightmost button on the toolbar).
Nuendo scans the network for any updated information about online users and/or shared projects, and refreshes the Shared Projects dialog accordingly.
 - The item “Users in Local Network” lists all the established users in a LAN.
 - The item “Global IP Network” lists all the users with whom you have established WAN connections (see [“Setting up WAN connections”](#) on [page 485](#)).
4. If there are plus signs beside these items, this indicates that a list of users can be displayed.
5. If a user is sharing projects, this is indicated by a plus sign beside the user name. Click this to display a list of the projects shared by this user.

If there are shared projects you can join, these are indicated by the text “You can join” in green.

6. To join a project, select it and click the “Join Project” button (or double-click the project name in the list). A dialog opens, allowing you to specify the project folder.



The “Join Project” button

7. Select a project folder.

There may be two cases which require special approaches:

- If you are connected over a LAN, the owner of the project may have decided to keep the project files in a special, common project folder on a server. If this is the case, you will need to specify this folder as the Project folder.
- If the owner of the project keeps the project files in a project folder on a local hard disk, select a local folder on your hard disk. In this case, the project files will be copied to the project folder on your hard disk.

See [“About the project folder”](#) on [page 491](#) for more information about the project folder in shared projects.

8. When you have selected a project folder, the project and the files are copied to your hard disk (unless you’re working on a server).

If you have access not to the entire project, but only separate tracks, only the tracks for which you have read or write permission will be loaded.

Downloading selected tracks

When you click the “Download Selected Tracks” button, you can select which tracks from which shared projects you want to download to your computer.

You will be asked whether you wish to create a new project. When you select No, the downloaded tracks will be added to your active project. Note that you cannot download tracks into a shared project.

Merging your project to the network project

When you click the “Merge Active Project to Selected Network Project” button, the currently active project will be merged with the selected Network project.

You will be asked whether you wish to download the shared project before merging.

- Clicking “No” allows you to simply commit your tracks without having to download all shared tracks. (Please stay connected until all others have received your tracks.)
- When you click “Yes”, you can join using your active project without having to create a new project locally.

The Project Sharing and Permissions dialog for your local project will be displayed. When you are happy with all permission settings, click on “Start Merge”. This will join the Network project and download all available tracks. When the download is complete, you can commit your tracks.

Disconnecting from projects

If you have joined a project and want to stop working on it, you do this by deactivating the network. When you deactivate the network during work with a shared project, you will disconnect from it. However, you will still have access to the project in the future as long as the owner shares it with you. The next time you connect to the network, the project will still be shared with you (unless the owner has changed the permissions) and you can join it again.

1. Pull down the Network menu and select the Active item, so that it is not checked to deactivate the network. A dialog will appear, asking you to confirm that you want to disconnect from the network.
 2. Click “Yes”.
- You will disconnect from the project.

- To reactivate the network, select “Active” on the Network menu again.
- A dialog opens, asking you to confirm that you want to reconnect to the network. If the project is accessible on the network, you will rejoin it and all the project files will be loaded (see below).

Working with shared projects

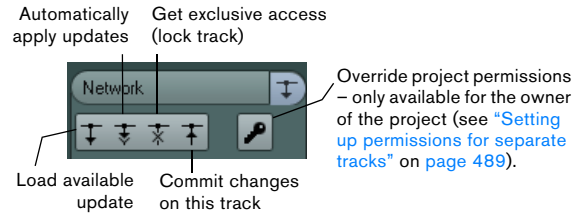
Any user who has write access to the project or separate tracks in it can make changes and commit these to the other users. The communication and transfer of updated files is handled mainly in the Network section for each track in the Inspector.

The permission status of a track is indicated in the Inspector as follows:

- If the symbol on the right of the Network tab in the Inspector is displayed in a lighter color, you have both read and write access to the track and can make changes to it.

- If the symbol on the right of the Network tab in the Inspector is orange, you have only read access to the track, and cannot make changes to it.

The Network section contains several controls for network-related track functions:



In addition to the above, the Network section also displays the user name of the owner of a project you join.

- ⇒ You can also customize Nuendo so that the four main network control buttons are available in the track list. This is done in the Track Controls Settings dialog, see “[Customizing track controls](#)” on page 573.

Committing changes

To a track

When you have made changes to a track, proceed as follows to commit them and make them known to the users in the network:


1. Open the Network section for the track in the Inspector by clicking its tab.
- If you have set things up so that the commit button is available in the track list, you do not have to use the Inspector.
2. Click the button “Commit changes on this track”.
- The changes are committed to the network.

- ⇒ If more than one track is selected, clicking this button for one selected track will commit the changes on all selected tracks. For the owner of a project, this is also the way to update permission settings made directly in the Inspector (see “[Setting up permissions for separate tracks](#)” on page 489).

To a project

If you have made changes to several tracks, or made other project changes, you will probably want to commit all changes at once:

- Pull down the Network menu and select “Commit Changes” to commit the changes over the network. Alternatively, you can click the corresponding button on the Project window toolbar. See [“Using the Setup options”](#) on [page 572](#) for information about how to customize the toolbar.

 Each time you commit a change to a track or project, network activity is initiated, slowing the network down. Depending on the speed of the network, it may take some time before the changes are distributed to all users and work can continue, so commit changes sparingly and only when necessary.

Loading changes

When other users have made changes to a track and committed them over the network, the “Load available update” button in the network controls for the corresponding track lights up to indicate that you can load the changes and update the project.

The “Load available update” button is located in the Network section of the Inspector. However, when working with shared projects, you will probably want to customize Nendo so that it is also available in the track list (see above), since this makes it somewhat easier to get a visual overview of when committed changes are available.

You can use two different methods to load available changes to tracks over the network:

- Click the “Load available update” button in the Inspector or the track list.
This will load the available update for the track.
- Click the “Automatically apply updates” button in the Inspector or the track list for one or more tracks.
This way, all changes committed to the track(s) by other users will be automatically loaded without requiring your intervention.

There is also a special method for loading changes made to the tempo and signature tracks, as well as loading new tracks:

- Click the “Sync project to network state” button in the Project window toolbar.
This button lights up to indicate that there are changes available. Click it to have any new tracks and any changes made to the tempo and signature tracks loaded.
 - ⇒ By default, the Network controls are not visible in the toolbar. If you want them to be visible, you need to customize the toolbar.
 - ⇒ You can also undo an update! If you have loaded an available update, you can select “Undo Net Update” from the Edit menu. Similarly, you can “undo the undo” by selecting “Redo Net Update”.

Locking tracks

If you have write permission for a track and want to prevent other users from making changes to it, you can lock it for your own use only.

- To lock a track for your exclusive use, click the “Get exclusive access” button for the track in the Inspector or the track list.
- To unlock a track, click the “Get exclusive access” button again so it is no longer lit.

The owner of a project can unlock a track, regardless of who locked it:

- When you click the “Get exclusive access” button for a locked track that was not locked by you, a warning message appears.
- When you are the owner of the project or track, select “Release Lock” to unlock the track.
Other users can only click “Cancel” to leave the track locked.

About network communication problems

In any network, occasionally, connections may be lost.

When network communication with a participant fails, you can initiate a communication verification process, and attempt to re-establish the lost connection, see [“Verify Communication”](#) on [page 486](#).

After the verification process, a dialog lists the results of the verification process. Nuendo may either have been able to restore communication through the process, or still be unable to communicate with some participant(s). The dialog lists each participant with whom communication still failed (see below).

At this point, you will have to decide whether to remove the participant(s) from the network:

- If you suspect the communication problems are temporary, select “No” and wait to see if communications can be restored.

You can then later manually perform the verification process if you wish (see below).

- If you believe the communication problems are more severe, for instance if the participant(s) have experienced a system or network crash, select “Yes”.

The participant(s) will then be removed from the network until able to re-join again.

If the verification process does not solve the problem, the communication problems are probably of a more serious nature and may require re-configuration of the network settings (see “[Setting up a network](#)” on [page 485](#)).

⇒ You can also initiate the verification process manually by selecting “Verify Communication” from the Network menu.

Reconnecting participants to the Master Network project

When several users have joined a Network project and this is unexpectedly disconnected from the network (i.e. it is not disconnected by e.g. deactivating the Network or by closing the project), these participants can be automatically reconnected.

Proceed as follows:

1. Open the Master project again.

The program automatically searches 10 seconds for the other users in the network. When users are found, a dialog is displayed.

2. Select “Reconnect” if you want the other user(s) to be automatically reconnected.

When you click the “Unshare” button, the project is unshared.

⇒ This only works if the Master project has been saved.

If you are unsure about the state of connection, it might be a good idea to unshare the project and to submit it as a new network project, in order to avoid conflicts.

Further options

Chatting with other users on the network

When you are connected to the network, it is possible to chat with other users to discuss changes you are making to shared projects. All network users can see the same chat window.

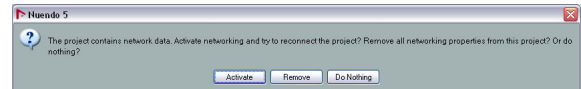
- To chat with all other users on the network, select “Open Global Chat”, type in your message in the window that opens and press [Return].

- To chat only with the users working on the currently shared project, select “Open Project Chat”, type in your message in the window that opens and press [Return].

⇒ Only messages entered after you joined the chat will be visible to you.

Opening projects with network settings

When you are loading a project containing network settings and the network is deactivated in Nuendo, the following dialog opens:



- Click “Activate” to activate the network in Nuendo and try to reconnect the project.

- Click “Remove” to remove all network settings.

You can choose this when you do not want to work in the network any longer, or if you have e.g. older projects with corrupt network settings.

- Click “Do Nothing” to open the project without changing any network settings.

Background

What is synchronization?

Synchronization is the process of getting two or more devices to play back together at the same exact speed and position. These devices can range from audio and video tape machines to digital audio workstations, MIDI sequencers, synchronization controllers, and digital video devices.

Synchronization basics

There are three basic components of audio/visual synchronization: position, speed, and phase. If these parameters are known for a particular device (the master), then a second device (the slave) can have its speed and position “resolved” to the first in order to have the two devices play in perfect sync with one another.

Position

The position of a device is represented by either samples (audio word clock), video frames (timecode), or musical bars and beats (MIDI clock).

Speed

The speed of a device is measured either by the frame rate of the timecode, the sample rate (audio word clock) or by the tempo of the MIDI clock (bars and beats).

Phase

Phase is the alignment of the position and speed components to each other. In other words, each pulse of the speed component should be aligned with each measurement of the position for the most accuracy. Each frame of timecode should be perfectly lined up with the correct sample of audio. Put simply, phase is the very precise position of a synchronized device relative to the master (sample accuracy).

Machine control (transport control)

When two or more devices are synchronized, the question remains: how do we control the entire system? We need to be able to locate to any position, play, record, and even jog and scrub the entire system using one set of controls.

Machine control is an integral part of any synchronization setup. In many cases, the device simply called “the master” will control the whole system. However, the term “master” can also refer to the device that is generating the position and speed references. Care must be taken to differentiate between the two.

Master and slave

Calling one device the “master” and another the “slave” can lead to a great deal of confusion. The timecode relationship and the machine control relationship must be differentiated in this regard.

In this document, the following terms are used:

- The “timecode master” is the device generating position information or timecode.
- The “timecode slave” is any device receiving the timecode and synchronizing or “locking” to it.
- The “machine control master” is the device that issues transport commands to the system.
- The “machine control slave” is the device receiving those commands and responding to them.

For example, Nuendo could be the machine control master, sending transport commands to an external device which in turn sends timecode and audio clock information back to Nuendo. In that case, Nuendo would also be the timecode slave at the same time. So calling Nuendo simply the master is misleading.

⇒ In most scenarios, the machine control slave is also the timecode master. Once it receives a play command, that device starts generating timecode for all the timecode slaves to synchronize to.

Timecode (positional references)

The position of any device is most often described using timecode. Timecode represents time using hours, minutes, seconds, and frames to provide a location for each device. Each frame represents a visual film or video frame.

Timecode can be communicated in several ways:

- LTC (Longitudinal Timecode) is an analog signal that can be recorded on tape. It should be used for positional information primarily. It can also be used for speed and phase information as a last resort if no other clock source is available.

- VITC (Vertical Interval Timecode) is contained within a composite video signal. It is recorded onto video tape and is physically tied to each video frame.
- MTC (MIDI Timecode) is identical to LTC except that it is a digital signal transmitted via MIDI.
- Sony P2 (9-Pin, RS-422) Machine Control also has a timecode protocol that is mainly used for locating and is not nearly accurate enough for speed and phase. It can be used in certain situations where there is no alternative.

⇒ The Nuendo SyncStation is capable of using 9-Pin timecode in a very accurate manner.

Timecode standards

Timecode has several standards. The subject of the various timecode formats can be very confusing due to the use and misuse of the shorthand names for specific timecode standards and frame rates. The reasons for this confusion are described in detail below. The timecode format can be divided into two variables: frame count and frame rate.

Frame count (frames per second)

The frame count of timecode defines the standard with which it is labeled. There are four timecode standards:

- **24fps Film (F)**
This frame count is the traditional count for film. It is also used for HD video formats and commonly referred to as "24p". However, with HD video, the actual frame rate or speed of the video sync reference is slower, 23.976 frames per second, so timecode does not reflect the actual realtime on the clock for 24p HD video.
- **25fps PAL (P)**
This is the broadcast video standard frame count for European (and other PAL countries) television broadcast.
- **30fps non-drop SMPTE (N)**
This is the frame count of NTSC broadcast video. However, the actual frame rate or speed of the video format runs at 29.97fps. This timecode clock does not run in realtime. It is slightly slower by 0.1%.
- **30fps drop-frame SMPTE (D)**
The 30fps drop-frame count is an adaptation that allows a timecode display running at 29.97fps to actually show the clock-on-the-wall-time of the timeline by "dropping" or skipping specific frame numbers in order to "catch the clock up" to realtime.

Confused? Just remember to keep the timecode standard (or frame count) and frame rate (or speed) separate.

Frame rate (speed)

Regardless of the frame counting system, the actual speed at which frames of video go by in realtime is the true frame rate.

In Nuendo the following frame rates are available:

- **23.9fps**
This frame rate is used for film that is being transferred to NTSC video and must be slowed down for a 2-3 pull-down telecine transfer. It is also used for the type of HD video referred to as "24p".
- **24fps**
This is the true speed of standard film cameras.
- **24.9fps**
This frame rate is commonly used to facilitate transfers between PAL and NTSC video and film sources. It is mostly used to correct for some error.
- **25fps**
This is the frame rate of PAL video.
- **29.97fps**
This is the frame rate of NTSC video. The count can be either non-drop or drop-frame.
- **30fps**
This frame rate is not a video standard anymore but has been commonly used in music recording. Many years ago it was the black and white NTSC broadcast standard. It is equal to NTSC video being pulled up to film speed after a 2-3 telecine transfer.
- **59.98fps**
This rate is also referred to as "60p". Many professional HD cameras record at 59.98fps. While 60fps could theoretically exist as a frame rate, no current HD video camera records at a full 60fps as a standard rate.

Frame count vs. frame rate

Part of the confusion in timecode stems from the use of "frames per second" in both the timecode standard and the actual frame rate. When used to describe a timecode standard, frames per second defines how many frames of timecode are counted before one second on the counter increments. When describing frame rates, frames per second define how many frames are played back during the span of one second of realtime. In other words: Regardless of how many frames of video there are per second of timecode (frame count), those frames can be moving at different rates depending on the speed (frame rate) of the video format. For example, NTSC timecode (SMPTE) has a frame count of 30fps. However, NTSC video runs at a rate of 29.97fps. So the NTSC timecode standard known as SMPTE is a 30fps standard that runs at 29.97 realtime.

⇒ When transferring material between various video formats and film, it becomes necessary to change the speed (frame rate) of one timecode standard so that video or film frames can line up in some mathematical relationship to the destination format. That is where all the various pull-ups and pull-downs come from. Certain frame rates were created as a result of applying a pull-down. For example, 23.976fps is actually 24fps pulled down by 0.1%. For more information on pulls, see [“About film transfers” on page 529](#) and [“Compensating for speed changes in Nuendo” on page 531](#).

Clock sources (speed references)

Once the position is established, the next essential factor for synchronization is the playback speed. Once two devices start playing from the same position, they must run at exactly the same speed in order to remain in sync. Therefore, a single speed reference must be used and all devices in the system must follow that reference. With digital audio, the speed is determined by the audio clock rate. With video, the speed is determined by the video sync signal.

Audio clock

Audio clock signals run at the speed of the sample rate used by a digital audio device and are transmitted in several ways:

Word clock

Word clock is a dedicated signal running at the current sample rate that is fed over BNC coaxial cables between devices. It is the most reliable form of audio clock and is relatively easy to connect and use.

AES/SPDIF Digital Audio

An audio clock source is embedded within AES and SPDIF digital audio signals. This clock source can be used as a speed reference. Preferably, the signal itself does not contain any actual audio (digital black), but any digital audio source can be used if necessary.

ADAT Lightpipe

ADAT Lightpipe, the 8-channel digital audio protocol developed by Alesis, also contains audio clock and can be used as a speed reference. It is transmitted via optical cables between devices.

⇒ Do not confuse the audio clock embedded in the Lightpipe protocol with ADAT Sync, which has timecode and machine control running over a proprietary DIN plug connection.

Video sync

Video sync signals are transmitted over BNC coaxial connections between devices and run at the frame rate of the video device.

There are two types of video sync signals:

- bi-level (also known as black burst)
- tri-level (used for HD video)

Complications arise when a video device is used as a speed reference. The video sync signal must be converted into an audio clock signal in order for audio devices to synchronize at the correct speed. This can be accomplished as follows:

- Using a dedicated synchronizer such as the Nuendo SyncStation from Steinberg.

A dedicated synchronizer can take a video sync signal (among others) and generate either word clock or AES/SPDIF signals that may be used as an audio clock source.

- Using a house sync generator.

A master sync generator such as the Rosendahl Nanosync HD can simultaneously generate video sync and audio clock from the same source. This ensures that both video and audio devices fed by the sync generator will run at the same speed.

⇒ Some audio cards and interfaces can accept a video sync signal as an audio clock source, performing a similar function to a dedicated synchronizer.

⚠ Care must be taken to ensure that the incoming video sync frame rate matches that of the Nuendo project.

MIDI clock

MIDI clock is a signal that uses position and timing data based on musical bars and beats to determine location and speed (tempo). It can perform the same function as a positional reference and a speed reference for other MIDI devices. Nuendo supports sending MIDI clock to external devices but cannot slave to incoming MIDI clock.

⚠ MIDI clock cannot be used to synchronize digital audio. It is only used for MIDI devices to play in musical sync with one another. Nuendo does not support being a MIDI clock slave.

Frame edge alignment (phase)

There are 1600 samples of audio in one frame of video running at 48kHz and 29.97fps. Phase alignment adjusts the playback of Nuendo so that the precise sample of audio is lined up with the leading edge of the timecode frame.

While it is possible to have very good sync without proper phase alignment, it will not be sample-accurate. With Nuendo there are four ways of achieving sample-accurate (phase aligned) sync:

- Using Steinberg's SyncStation synchronizer.

The SyncStation can resolve video sync, word clock, and timecode all in one unit with extensive machine control capabilities.

- Using Steinberg's Time Base synchronizer.

The Time Base has the ability to align the audio clock with the incoming timecode.

- Using VST System Link.

VST System Link connects multiple workstations together using digital audio connections. System Link uses the sample clock for position and speed references, ensuring sample-accurate synchronization.

- ASIO Positioning Protocol (APP)

Specific ASIO audio cards that have built in timecode readers support Steinberg's APP. APP is able to analyze the incoming timecode and compare that to the sample clock to provide sample-accurate synchronization.

⚠ APP is only supported when Nuendo is a timecode slave.

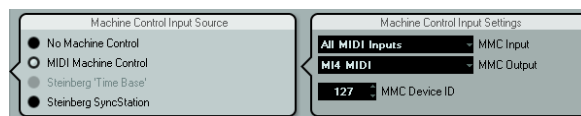
The Project Synchronization Setup dialog

Nuendo's Project Synchronization Setup dialog provides a central place to configure a complex synchronized system. In addition to settings for timecode sources and machine control settings, project setup parameters are available along with basic transport controls for testing the system.

To open the Project Synchronization Setup dialog, proceed as follows:

- On the Transport menu, select the "Project Synchronization Setup..." option.
- On the Transport panel, [Ctrl]/[Command]-click the Sync button.

The dialog is organized into sections separating related groups of settings. The arrows shown between the various sections of the dialog indicate how settings in one section influence settings in another section. In the following, the available sections are described in detail.

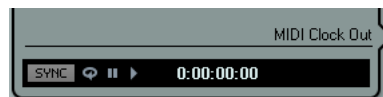


The Machine Control Input Settings are linked to the Machine Control Input Source.

The Nuendo section

At the center of the Project Synchronization Setup dialog is the Nuendo section. It is provided to help you visualize the role that Nuendo takes in your setup. It shows which external signals enter or leave the application.

The only controls available in the Nuendo section are the transport controls and the Sync button at the bottom. These controls are duplicates of the ones found in the Transport panel and are made available in order to test various synchronization settings.



Sync button and transport controls in the Nuendo section

The two Project Setup sections

The Project Setup sections at the bottom left of the Project Synchronization Setup dialog are related to the active project in Nuendo. Therefore they are only visible if you have opened a project in Nuendo. Here you can change timecode parameters and project options that affect synchronization. These settings are identical with the settings in the Project Setup dialog, see [“The Project Setup dialog” on page 57](#).

Unlike the other settings in the Project Synchronization Setup dialog, which are applied globally, the Project Setup options are saved with the active project.

Applying changes to the project setup

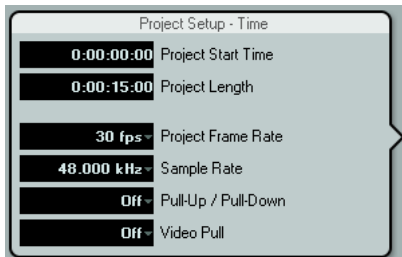
When you change any of the parameters in the Project Setup sections, the title bar of the top section changes to “Apply”. Click anywhere on that title bar to apply your changes. If you close the Project Synchronization Setup dialog without applying your Project Setup changes, these will be lost.

Changing the Project Setup settings in the Project Synchronization Setup dialog instead of the Project Setup dialog allows you to test your changes without having to exit the dialog.



Project Setup - Time

The “Project Setup - Time” section has six settings that relate to timecode and playback speed in Nuendo.



Project Start Time

This setting determines the timecode value at the start of the project. For example, many video timelines start at 01:00:00:00 to allow for pre-roll and test tones prior to the one hour mark. In that case, a start time of 00:55:00:00 might be appropriate.

Project Length

This setting determines how much timeline Nuendo allocates to the project. Note that the more time is allocated, the more resources are used. Therefore it is advised to set the length to a reasonable amount for the current project.

Project Frame Rate

This setting determines both the timecode standard and frame rate for the project. Make sure that this setting matches the frame rate of any incoming timecode.

Sample Rate

This setting determines the sample clock speed of Nuendo’s audio engine. Ensure that this setting matches the sample rate of incoming word clock signals or other audio clock sources. For further information about this setting, refer to [“The Project Setup dialog” on page 57](#).

Pull-Up/Pull-Down

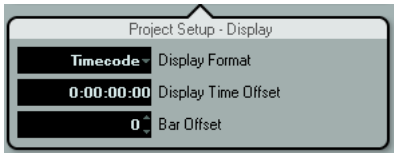
This setting affects the speed of the audio transport in Nuendo. If Nuendo’s playback is slowed down or sped up via an external sample clock source, you need to adjust the time displays accordingly by selecting the correct pull factor. For detailed information on audio pull-up and pull-down operations, see [“Adjusting audio playback speed” on page 531](#).

Video Pull

This setting affects the video playback speed in Nuendo. The video playback rate may also be pulled up or down, depending on the need. For more information on video pull, see [“Video pull-up and pull-down” on page 533](#).

Project Setup - Display

Regardless of the technical needs of a project's timeline, the user might want to see time information displayed in a different format. The settings in the “Project Setup - Display” section allow you to change how Nuendo’s timeline is displayed, but not the underlying timeline itself.



Display Format

This setting determines how Nuendo displays time in the Project window and the primary display of the Transport panel.

Display Time Offset

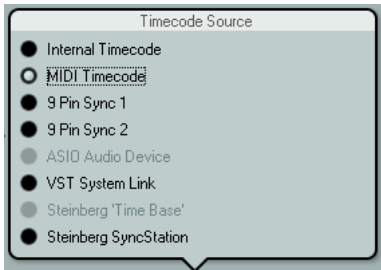
The value set in this field will be added or subtracted from the current timeline position. This setting is used for display only.

Bar Offset

This setting allows you to specify timeline display offsets in musical terms instead of timecode. The Bar Offset value is independent of the “Display Time Offset” value.

Timecode Source

The Timecode Source setting determines whether Nuendo is acting as timecode master or slave.



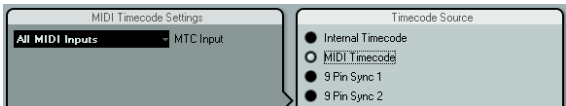
When set to “Internal Timecode”, Nuendo is the timecode master, generating all position references for any other device in the system. The other options are for external timecode sources. Selecting any of these, makes Nuendo a timecode slave when the Sync button is activated.

Internal Timecode

Nuendo generates timecode based on the project timeline and project setup settings. The timecode will follow the format specified in the Project Setup section.

MIDI Timecode

Nuendo acts as a timecode slave to any incoming MIDI timecode (MTC) on the port(s) selected in the MIDI Timecode Settings section, now visible to the left of the Timecode Source section.



Selecting “All MIDI Inputs” allows Nuendo to sync to MTC from any MIDI connection. You can also select a single MIDI port for receiving MTC.

9 Pin Sync 1 & 2

Timecode polling over Sony's 9-Pin RS422 protocol can be used as a timecode source. For more information, see “Machine Control Output Settings – 9-Pin Control 1 and 2” on [page 505](#).

⚠ Using 9-Pin timecode is not recommended without using Steinberg's SyncStation hardware. In other scenarios it should only be used if no other timecode source is available.

When you select one of the 9-Pin options, further settings become available in the “9-Pin Device Settings” section to the left of the Timecode Source section:

Option	Description
Serial Port pop-up menu	Use this pop-up menu to select the serial port corresponding to the source of the 9-pin timecode.

Option	Description
Control Playback Speed	When this option is activated, Nuendo will attempt to control the playback speed of the 9-pin device.
Displays follow locating device	When this option is activated, the Project cursor will follow the incoming timecode's position. This is very helpful with tape-based devices as they locate much slower than non-linear systems. The cursor gives you a visual indication of the position of the tape machine at all times.

ASIO Audio Device

This option is only available with audio cards that support ASIO Positioning Protocol. These audio cards have an integrated LTC reader or ADAT sync port and can perform a phase alignment of timecode and audio clock.

VST System Link

VST System Link can provide all aspects of sample-accurate synchronization between other System Link workstations. For information on configuring VST System Link, see [“Working with VST System Link”](#) on [page 512](#).

Steinberg Time Base

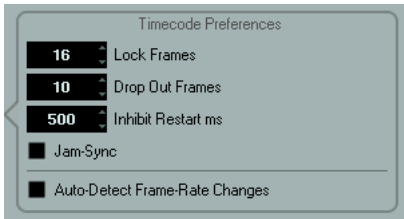
The Time Base is a hardware synchronizer that can provide sample-accurate sync for Nuendo. Please refer to the documentation that comes with the unit for setup instructions.

Steinberg SyncStation

The SyncStation is a full-featured hardware synchronizer with extensive machine control capabilities that provides sample-accurate sync with a variety of external devices. Please refer to the documentation that comes with the unit for setup instructions.

Timecode Preferences

When MIDI Timecode, Steinberg Time Base, or Steinberg SyncStation is selected, the Timecode Preferences section becomes available, providing several options for working with external timecode.



Lock Frames

This setting determines how many full frames of timecode it takes for Nuendo to try and establish sync or “lock”. If you have an external tape transport with a very short start-up time, try lowering this number to make lock-up even faster. This option can only be set to multiples of two.

Drop Out Frames

This setting determines the amount of missed timecode frames it takes for Nuendo to stop. Using LTC recorded on an analog tape machine can result in some amount of drop outs. Increasing this number allows Nuendo to “free-wheel” over missed frames without stopping. Lowering this number causes Nuendo to stop sooner once the tape machine has stopped.

Inhibit Restart ms

Some synchronizers still transmit MTC for a short period after an external tape machine has been stopped. These extra frames of timecode sometimes cause Nuendo to restart suddenly. The “Inhibit Restart ms” setting allows you to control the amount of time in milliseconds that Nuendo will wait to restart (ignoring incoming MTC) once it has stopped.

Jam-Sync

When the Jam-Sync option is activated, Nuendo will ignore any changes in timecode once it has started playback. This can be useful in special situations, such as synchronizing to broken timecode.

⚠ When Jam-Sync is enabled, the “Drop Out Frames” value is ignored so that Nuendo does not stop if timecode is interrupted.

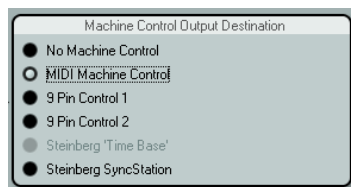
Auto-Detect Frame-Rate Changes

Nuendo can notify the user when the frame rate of timecode changes at any point. This is helpful in diagnosing problems with timecode and external devices. This notification will interrupt playback or recording. Deactivating this option will avoid any interruption in playback or recording.

⚠ If there is a discrepancy between the project frame rate in Nuendo and incoming timecode, Nuendo might still be able to lock to the incoming timecode. If the user is unaware of these differences, problems can arise later in postproduction.

Machine Control Output Destination

When the Sync button on the Transport panel is activated, all transport commands (including movements of the cursor in the Project window) are translated into machine control commands and routed according to the settings made in the “Machine Control Output Destination” section.



No Machine Control

When this option is selected, transport commands are not routed or sent to any device. This does not affect the operation of the individual 9-Pin and MMC Device panels. They can still function regardless of the machine control destination. The machine control output destination only defines the routing of transport commands from Nuendo while sync is enabled.

MIDI Machine Control

When this option is selected and sync is enabled, all transport commands from the Nuendo transport are routed to MMC devices connected to the MIDI ports that you defined in the “Machine Control Output Settings” section (see “Machine Control Output Settings” on page 504).

9-Pin Control 1 and 2

When one of the 9-Pin Control options is selected and sync is enabled, transport commands from Nuendo are routed to the 9-Pin Device 1 or 2, as configured in the “Machine Control Output Settings” section (see “Machine Control Output Settings” on page 504).

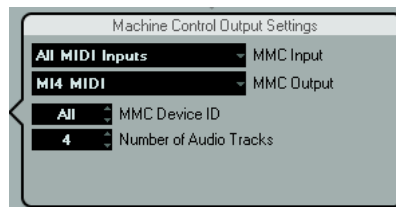
Steinberg ‘Time Base’ and Steinberg SyncStation

When this option is selected and sync is enabled, transport commands from Nuendo are routed to a connected Time Base or Nuendo SyncStation unit (respectively). Please refer to the documentation that comes with your unit for complete information on its operation.

Machine Control Output Settings

Each machine control destination has settings associated with it. These settings configure how the remote device will respond to transport commands from Nuendo.

Machine Control Output Settings – MIDI Machine Control



There are four settings associated with MIDI Machine Control Operation:

MMC Input and Output

The MMC Input and MMC Output settings determine which MIDI port in your system will send and receive MMC commands. Set both the input and output to MIDI ports that are connected to the desired MIDI device.

MMC Device ID

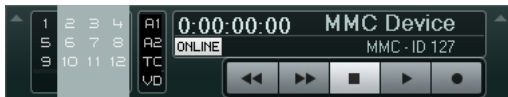
The MMC device ID should be set to the same number as the receiving device. You can also set the device ID to “All” if more than one machine is receiving MMC commands or if the device ID is not known.

⇒ Some devices can only listen to their specific IDs. Therefore, using the All option will not work with such devices.

Number of Audio Tracks

The number of audio tracks should be set to match the amount of available audio tracks in the destination device. This setting determines how many record-enable buttons are shown in the MMC Master panel (see below).

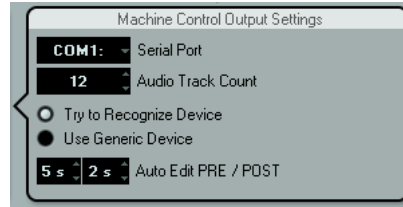
MMC Master panel



The MMC Master panel can be opened from the Devices menu. In order to use the MMC Master panel, proceed as follows:

- Open the Preferences dialog, select the MIDI Filter section and make sure SysEx is activated in the Thru section. This is necessary since MMC uses two-way communication (the tape recorder “replies” to the MMC messages it receives from Nuendo). By filtering out SysEx Thru, you ensure that these MMC System Exclusive replies are not echoed back to the tape recorder.
- On the MMC Master panel, activate the Online button to use the transport buttons on the panel to control the transport of the device.
It is not necessary to have this activated in order to synchronize with the MMC device. It only affects operation of the MMC Master panel.
- You can use the buttons to the left on the MMC Master panel to arm tape tracks for recording.
- The “A1, A2, TC, VD” items refer to additional tracks usually found on video tape recorders.
Refer to the manual of your VTR device to see if these tracks are supported.

Machine Control Output Settings – 9-Pin Control 1 and 2



Serial Port

The two 9-Pin devices connect to your computer from available serial ports. Use the Serial Port pop-up menu to select the appropriate serial port.

- ⚠ PCs and Apple computers use different types of serial ports. PCs typically provide a RS232 interface on a 9-Pin Dsub connection that must be converted to RS422 in order to interface with Sony 9-Pin devices. Apple computers require a USB to RS422 serial converter such as the Keyspan USA-19W.

Audio Track Count

Use this option to specify how many audio tracks are available. The 9-Pin Device panel will then contain the same amount of record-enable buttons.

‘Try to Recognize Device’ vs. ‘Use Generic Device’

The RS422 9-Pin protocol can control a wide variety of devices. Each device may have differing features. Nuendo has a library of device profiles that can be used with 9-Pin devices.

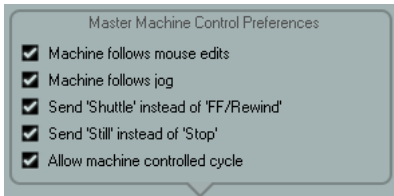
You can choose whether Nuendo will try to recognize the device by polling it and comparing that to its library, or you can use a generic device profile.

Auto Edit PRE/POST

Auto Edit is a feature of 9-Pin devices that allows for automatic punch in and out on record-enabled tracks. The pre-roll and post-roll times determine where the 9-Pin device will start and stop playback during an Auto Edit procedure. For more information on Auto Edit, see [“9-Pin Auto Edit” on page 508](#).

Master Machine Control Preferences

There are five preference settings for Nuendo's master machine control operation. They affect how the machine reacts to various commands from Nuendo.



Machine follows mouse edits

When this option is activated, moving the project cursor with the mouse results in transport commands so that the machine continuously locates to the new cursor position.

If this causes a great deal of unnecessary tape winding, you can deactivate the option. In that case transport commands are only sent to the machine when the mouse button is released.

Machine follows jog

When this option is activated, turning the jog wheel on the Transport panel or on a remote controller results in transport commands so that the machine continuously locates to the new project cursor position.

Again, this might cause a great deal of unnecessary tape winding. If disabled, transport commands are only sent to the machine when the user stops moving the wheel.

Send 'Shuttle' instead of 'FF/Rewind'

Many video decks respond differently to Shuttle commands or FF/Rewind commands. FF/Rewind commands often result in the tape being released from the heads and the motors entering a high-speed wind mode. This takes a great deal of time, and the machine cannot read the timecode on the tape while winding. Therefore position information is lost. Activate this option if shuttle commands are preferred.

Send 'Still' instead of 'Stop'

Similar to FF/Rewind commands, Stop commands result in the tape being released from the heads. Still commands on the other hand, also cause the transport to stop, but without releasing the tape from the heads. Activate this option if you want the picture from the video deck to be visible also in Stop mode or if you want the machine to enter playback mode faster.

Allow machine controlled cycle

When this option is activated, Nuendo starts playback at the left locator minus the pre-roll time and stops playback at the right locator plus the post-roll time. When repeating a section, Nuendo locates back to the pre-roll position and waits for the machine to reach that position before issuing a start command.

If this option is deactivated, the machine will not follow when Nuendo cycles. Upon reaching the right locator, Nuendo locates back to the left locator, but the machine continues playback.

Machine Control Input Source

Nuendo can respond to machine control commands from external MIDI and 9-Pin devices. Nuendo can follow incoming transport commands (locate, play, record) and respond to record-enabling commands for audio tracks. This allows Nuendo to easily integrate into larger studio systems with centralized machine control and synchronization such as theatrical mixing stages.



MIDI Machine Control

When MIDI Machine Control is selected as the input source, several settings become available in the Machine Control Input Settings section:

Option	Description
MMC Input	Set this to the MIDI input that is connected to the master machine control device.

Option	Description
MMC Output	Set this to the MIDI output that is connected to the master machine control device.
MMC Device ID	This determines the MIDI ID number that is used to identify the machine in Nuendo.

⚠ The MMC protocol involves polling devices (requesting information) for their status which requires two way communication. While some functions may work with only one way communication, it is best to connect both MIDI ports (input and output) of MMC devices. Refer to “[MMC Master panel](#)” on [page 505](#) to ensure that the MIDI filter is set up correctly.

Steinberg ‘Time Base’

When the Time Base unit is connected to Nuendo, there are various settings for machine control input. Please refer to the documentation that comes with the Time Base for complete information on its use.

Steinberg SyncStation

When the SyncStation is selected as the machine control input source, there are several options for how these commands are routed within the SyncStation itself. Please refer to the documentation that comes with the SyncStation for complete information on its use.

MIDI Timecode Destinations

Nuendo can send MTC to any MIDI port. Use this section to specify the MIDI ports to which MTC is routed. Devices that can lock to MTC will chase Nuendo’s timecode position.

⇒ Some MIDI interfaces send MTC over all ports by default. If this is the case, only select one port of the interface for MTC.



MIDI Timecode Follows Project Time

Activate this option to ensure that the MTC output follows Nuendo’s time position at all times including looping, locating, or jumping while playing. If not, MTC will continue on without changing locations at a loop or jump point until playback stops.

Timecode Offset

This option allows you to specify an offset to be applied to outgoing MTC. The amount of offset will be added or subtracted from the project’s current position before being transmitted.

MIDI Clock Destinations

Some MIDI devices like drum machines can match their tempo and location to incoming MIDI clock. Select any MIDI ports that you wish to output MIDI clock.



MIDI Clock Follows Project Position

Activate this option to ensure that the MIDI clock device follows Nuendo when looping, locating, or jumping while playing.

⇒ Some older MIDI devices might not respond well to these positioning messages and could take some time synchronizing to the new location.

Always Send Start Message

MIDI clock transport commands include Start, Stop, and Continue. However, some MIDI devices do not recognize the Continue command. By activating the “Always Send Start Message” option, you can avoid this problem with specific MIDI devices.

Send MIDI Clock in Stop Mode

Activate this option if you are working with a device that needs MIDI clock to run continuously in order to operate arpeggiators and loop generators.

Synchronized operation

Once you have connected all the devices that will be synchronized, it is important to understand how Nuendo operates in Sync mode. Sync mode is enabled by activating the Sync button on the Transport panel.



Sync mode

When you activate the Sync button, the following happens:

- Transport commands are routed to the machine control destination output as specified in the Project Synchronization Setup dialog.

Locate, Play, Stop, and Record commands will now be sent to an external device.

- Nuendo awaits incoming timecode from the chosen timecode source defined in the Project Synchronization Setup dialog in order to play.

Nuendo will detect incoming timecode, locate to its current position, and start playback in sync with the incoming timecode.

In a typical scenario, an external tape machine (e.g. a VTR) has its timecode output connected to Nuendo. Nuendo is sending machine control commands to the deck. When Sync is activated and you click Play on the Transport panel, a play command is sent to the VTR. The VTR in turn starts playback, sending timecode back to Nuendo. Nuendo then synchronizes to that incoming timecode.

If the “Machine follows mouse edits” option is activated and you change the project cursor position with the mouse or key command, machine control commands are sent to the remote deck so it will locate to the new position.

In this way, synchronized operation is somewhat invisible to the user. Just go about editing and mixing while the synchronized devices chase all movements of the cursor automatically.

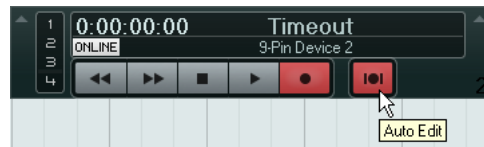
- ⚠ With tape-based devices, synchronized operation will be slower due to the winding time necessary for the tape machine to locate to a new position.

Nuendo's Edit Mode will take advantage of this feature by locating the VTR to the start of the first selected event. For more information about Edit Mode, see [“About the Edit Mode”](#) on [page 527](#).

9-Pin Auto Edit

Most 9-Pin devices such as VTRs have the capability of performing very accurate punch-ins and punch-outs on audio tracks. These punches are tied to video frames and are programmed using timecode. This type of recording is called an “Auto Edit”.

Nuendo can use its auto-punch feature to program Auto Edit functions of a VTR via 9-Pin control. The left and right locators in the Project window define the punch in and punch out of the Auto Edit. Provided that Nuendo is in Sync mode, pressing the Auto Edit button on the 9-Pin Device panel causes the punch-in to happen automatically.



- ⇒ Auto Edits can only happen on a timecode frame. Punching in or out in between video frames is not possible.

- ⚠ In order to use the 9-Pin Device panel to control an external deck, the Online button must be activated and tracks must be armed.

Auto Edit Pre-Roll and Post-Roll

Since VTRs require some amount of pre-roll time in order to get tape up to speed for proper recording, each 9-Pin device has options for setting a pre-roll and post-roll amount in seconds. The default values of 5 seconds pre-roll and 2 seconds post-roll should work in most cases. You can change these values in the “Machine Control Output Settings” section, see [“Machine Control Output Settings – 9-Pin Control 1 and 2”](#) on [page 505](#).

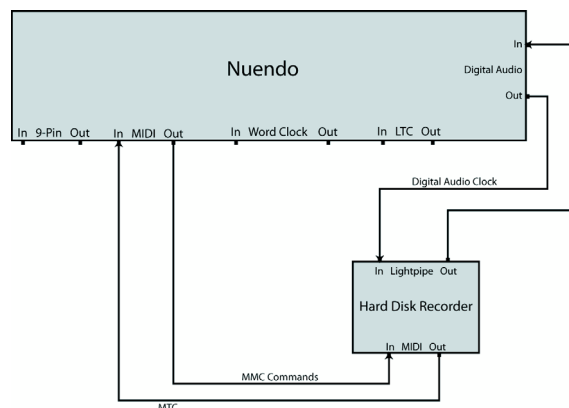
Example scenarios

To better understand how synchronization options can be utilized, three example scenarios are provided.

Personal music studio

In a personal music studio, the user might have the need of synchronizing with an external recording device such as a portable hard disk recorder used for live remote recordings.

In this example, MIDI will be used for timecode and machine control while the audio clock will be handled by Lightpipe digital audio connections.



- When the Sync button is activated, Nuendo sends MMC commands to the hard disk recorder. Nuendo can remotely start playback of the recorder.
- The hard disk recorder is using audio clock from Nuendo's audio interface as the speed reference. It is also possible for Nuendo to use the audio clock from the recorder. The audio clock is carried over the Lightpipe digital audio connection that also carries audio signals.
- The hard disk recorder sends back MTC to Nuendo. When the recorder begins playing, MTC is sent back to Nuendo which will sync to that timecode.

Sync settings for a personal music studio

To synchronize the devices in this example scenario, proceed as follows:

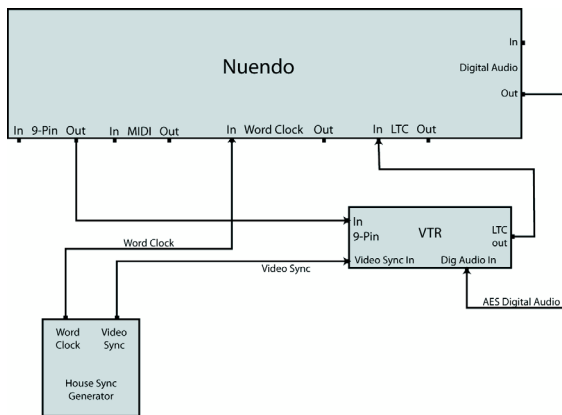
1. Make the connections as shown in the diagram above. In this simple example, any device that uses MTC can be substituted.
2. Open the Project Synchronization Setup dialog and select "MIDI Timecode" as the timecode source. When recording from the hard disk recorder into Nuendo, Nuendo will be the machine control master and the timecode slave, locking to incoming MTC.
3. In the "Machine Control Output Destination" section, select the "MIDI Machine Control" option. Nuendo will now send MMC commands to the hard disk recorder to locate and start playback.
4. In the "Machine Control Output Settings" section, assign the MIDI input and output ports that are connected to the hard disk recorder. Since MMC uses two-way communication, both MIDI ports should be connected. Be sure the MIDI filter does not echo SysEx data.
5. On the Transport panel, activate the Sync button. This routes transport commands to the hard disk recorder via MIDI and sets Nuendo as the timecode slave.
6. On the hard disk recorder, enable MMC and MTC. Follow the instructions on how to set up the unit to receive MMC commands and transmit MTC.
7. In Nuendo, click the Play button.

The hard disk recorder should start playback and send MTC to Nuendo. Once Nuendo syncs to MTC, the status on the Transport panel should read "Lock" and show the current frame rate of incoming MTC.

Postproduction suite

In audio for video postproduction, synchronization needs are an everyday concern. Very often users need to synchronize with a 9-Pin VTR in order to work with video material. At the same time the audio clock has to be synchronized with the video clock source to ensure that both audio and video run at the same speed.

Finished audio can then be recorded back onto the digital audio tracks of a VTR in perfect sync with the video (known as a “layback”). In this example, 9-Pin machine control is used. The audio clock is a word clock signal generated by the house sync generator that also generates the video sync signal. Timecode is handled by a SMPTE to MTC reader (e.g. in the audio interface).



- The house sync generator creates both the video sync and audio word clock so that the VTR and Nuendo play at the same speed.

When laying back digital audio to the VTR, the AES signal will already be in sync with the VTR's digital audio inputs.

- 9-Pin machine control is used to manipulate the VTR's transport.

The VTR can shuttle, locate, play, and record from commands issued by Nuendo. Also, Nuendo can arm audio tracks on the VTR for layback.

- When the VTR enters play, LTC is fed back to Nuendo which locks to that incoming timecode.
If the LTC reader is part of an audio card that is APP compatible, sample-accurate synchronization is possible in this scenario.

Sync settings for audio layback in a postproduction suite

These steps outline the process of “laying back” finished audio to the VTR. To configure Nuendo for this example setup, proceed as follows:

1. Make the connections as shown in the diagram above. Ensure that video sync and word clock are tied to the same generating source!

2. Open the Project Synchronization Setup dialog and select either “ASIO Audio Device” or “MIDI Timecode” as the timecode source.

Depending on your system's configuration, the sound card might have an LTC reader built into it or you may have to use a LTC to MTC converter interface to get timecode into Nuendo.

3. In the “Machine Control Output Destination” section, select 9-Pin Control 1 or 2.

Nuendo's transport buttons will send commands to the VTR over the 9-Pin RS422 connection.

4. From the Devices menu, select the 9-Pin Device 1 or 2 option.

Using the Auto Edit feature, you will be able to perform laybacks to the VTR via digital audio connections. VTRs with digital audio tracks use 48kHz as a standard sampling rate. Some decks only have 20 bit depth capacity so make sure to dither properly for the intended delivery format.

5. Click the Online button.

Now you can use the device panel to control the VTR.

6. Test the transport with the 9-Pin Device panel.

Ensure that all connections are working properly by testing the various transport buttons on the 9-Pin Device panel.

7. Record-enable the audio tracks that you wish to record to.

Most professional VTRs have four audio tracks. Many high-definition VTRs have eight for recording 6-channel surround sound plus a stereo downmix all on the same tape.

8. Play back the project and look at the meters on the VTR to ensure that proper recording levels are set.
That way you can also make sure that the digital audio connections are working properly.

9. Set the left and right locators to the punch in and punch out points.

Auto Edit uses the left and right locators to program the record in and out points of the VTR.

10. Ensure that the pre-roll and post-roll times are appropriate for the VTR.

In most cases, the default values will be sufficient for the VTR to get up to speed before punching in.

11. On Nuendo's Transport panel, activate the Sync button. This turns Nuendo into a timecode slave. Once the VTR starts to play, Nuendo will sync to incoming timecode.

12. On the 9-Pin Device panel, click the Auto Edit button. This starts the Auto Edit process. The tape transport locates to the set pre-roll position (by default, 5 seconds before the left locator) and starts playback. When the left locator is reached, the VTR enters record mode.

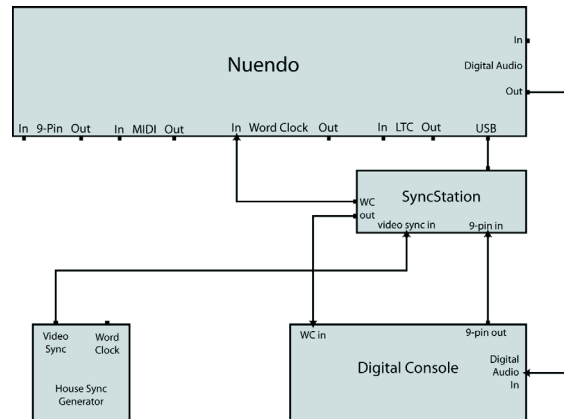
13. The Auto Edit is complete when the right locator is reached and the VTR goes out of record.

After reaching the right locator, the VTR continues playing for the set post-roll time (by default 2 seconds) before it stops.

Theatrical mixing stage

A theatrical mixing stage (also known as a dub stage) is a large theater-sized room used to create the final mixdown for feature films that will be presented in theaters with surround sound. These types of studios are very complex, dealing with hundreds of audio tracks at once through large mixing consoles along with high-quality video and film playback systems.

In this example, Nuendo is only one part of a very large system of devices that need to be perfectly synchronized with one another. An external master 9-Pin controller will operate the transport of the entire system remotely from the console and timecode will be handled via 9-Pin interface through the SyncStation. The audio clock will be referenced to tri-level HD video sync fed to the SyncStation which will output dedicated word clock to both Nuendo and the digital console.



- Audio clock is generated by the house sync generator. In this example, video sync is being fed to the SyncStation as both a speed reference and a phase reference for sample-accurate sync. Word clock goes from the SyncStation to Nuendo and the digital console.

- The console is the machine control master, sending 9-Pin control commands and status messages to the SyncStation.

The console controls the playback in Nuendo via the SyncStation. Nuendo is the timecode slave. The SyncStation is acting as a machine control slave.

- Timecode is fed to the SyncStation via 9-Pin and then via a USB connection to Nuendo (as MTC).

The SyncStation's 9-Pin interface is capable of using 9-Pin timecode effectively for accurate synchronization. Direct serial port 9-Pin connections should not be used this way.

Sync settings for a theatrical mixing stage

To configure Nuendo for this example setup, proceed as follows:

1. Make the connections as shown in the diagram above. In this example, the SyncStation handles many of the synchronization tasks. Please refer to the documentation that comes with the SyncStation for complete information on its operation.

2. Open the Project Synchronization Setup dialog and select the SyncStation as the timecode source.

The SyncStation sends MTC over the USB connection to Nuendo. The SyncStation will use its "Virtual Master" mode to generate timecode.

3. In the “Machine Control Input Source” section, select the SyncStation option.

Provided that the SyncStation is set to route record and track arming commands to Nuendo, this will allow the digital console to record-enable audio tracks in Nuendo and enter record mode via 9-Pin commands sent to the SyncStation.

4. On the Transport panel, activate the Sync button.

Nuendo will await incoming timecode from the SyncStation.

5. Test the record-enable buttons on the console.

If configured properly, the corresponding audio tracks in Nuendo become record-enabled.

6. Press play on the console’s transport control.

This will send the play commands to the SyncStation over 9-Pin and the SyncStation will start generating timecode to synchronize Nuendo.

Working with VST System Link

VST System Link is a network system for digital audio that allows you to have several computers working together in one large system. Unlike conventional networks it does not require Ethernet cards, hubs, or CAT-5 cables; instead it uses the kind of digital audio hardware and cables you probably already possess in your studio.

VST System Link has been designed to be simple to set up and operate, yet give enormous flexibility and performance gains in use. It is capable of linking computers in a “ring” network (the System Link signal is passed from one machine to the next, and eventually returns to the first machine). VST System Link can send its networking signal over any type of digital audio cable, including S/PDIF, ADAT, TDIF, or AES, as long as each computer in the system is equipped with a suitable ASIO compatible audio interface.

Linking up two or more computers gives you vast possibilities:

- Dedicate one computer to running VST instruments while recording audio tracks on another.
- If you need lots of audio tracks, you may simply add tracks on another computer.
- You could have one computer serve as a “virtual effect rack”, running CPU-intensive send effect plug-ins only.
- Since you can use VST System Link to connect different VST System Link applications on different platforms, you can take advantage of effect plug-ins and VST instruments that are specific to certain programs or platforms.

Requirements

The following equipment is required for VST System Link operation:

- Two or more computers.

These can be of the same type or use different operating systems – it does not matter. For example, you can link an Intel-based PC to an Apple Macintosh without problems.

- Each computer must have audio hardware with specific ASIO drivers.

- The audio hardware must have digital inputs and outputs.

To be able to connect the computers, the digital connections must be compatible (i.e. the same digital formats and connection types must be available).

- At least one digital audio cable must be available for each computer in the network.

- A VST System Link host application must be installed on each computer.

Any VST System Link application can connect to another.

Additionally, use of a KVM switchbox is recommended.

Using a KVM switchbox

Whether you want to set up a multi-computer network or a small network in a limited space, it is a good idea to invest in a KVM (Keyboard, Video, Mouse) switchbox. With one of these you can use the same keyboard, monitor, and mouse to control each computer in the system, and you can switch between computers very rapidly. KVM switchboxes are not too expensive, and they are very easy to set up and operate. If you decide not to go this route, the network will function just the same, but you may end up doing a lot of jumping from one machine to the other while setting up!

Making connections

Below, we assume that you are connecting two computers. Should you have more than two computers, it is still best to start with two and add the others one by one once the system is working – this makes troubleshooting easier if you run into problems. For two computers, you will need two digital audio cables, one in each direction:

1. Use the first digital audio cable to connect the digital output of computer 1 to the digital input of computer 2.
 2. Use the other cable to connect the digital output of computer 2 to the digital input of computer 1.
- If a card has more than one set of inputs and outputs, choose whichever one that suits you – for simplicity usually the first set is best.

Synchronization

Before you proceed, you need to make sure that the clock signals on your ASIO cards are synchronized correctly. This is essential when cabling any kind of digital audio system, not just VST System Link.

⚠ All digital audio cables by definition always carry a clock signal as well as audio signals, so you do not have to use a special word clock input and output for this (although you may find that you get a slightly more stable audio system if you do, especially when using multiple computers).

The clock mode or sync mode is set up in the ASIO control panel of the audio hardware. Proceed as follows:

1. From the Devices menu, open the Device Setup dialog.
2. On the VST Audio System page, select your audio interface from the ASIO Driver pop-up menu.
In the Devices list, the name of the audio interface now appears as a sub-entry to the “VST Audio System” entry.
3. In the Devices list, select your audio interface.
4. Click the Control Panel button.
The ASIO control panel appears.
5. Open the ASIO control panel on the other computer as well.

If you are using another VST System Link host application on that computer, check its documentation for details on how to open the ASIO control panel.

6. Now you need to make sure that one audio card is set to be the clock master and all other cards are set to be clock slaves (i.e. they listen for the clock signal coming from the clock master).

The naming and procedure for this differs depending on the audio hardware – consult its documentation if required. If you are using Steinberg Nuendo ASIO hardware, all cards default to the AutoSync setting. In this case you must set one of the cards (and only one) to “Master” in the Clock Mode section of the control panel.

- Typically, the ASIO control panel for an audio card contains some indication of whether or not the card receives a proper sync signal, including the sample rate of that signal. This is a good indication that you have connected the cards and set up clock sync properly. Check your audio hardware’s documentation for details.

⚠ It is very important that only one card is the clock master, otherwise the network cannot function correctly. Once you have set this up, all the other cards in the network will take their clock signal from this card automatically.

The only exception to this procedure is if you are using an external clock – from a digital mixing desk or a special word clock synchronizer, for example. In that case you must leave all your ASIO cards in clock slave or AutoSync mode and make sure that each of them is listening for the signal coming from the synchronizer. This signal is usually passed through your ADAT cables or word clock connectors in a daisy chain fashion.

VST System Link and latency

The general definition of latency is the amount of time it takes any system to respond to whatever messages are sent to it. For example, if your system’s latency is high and you play VST instruments in realtime, you will get a noticeable delay between when you press a key and when you hear the sound of the VST instrument. Nowadays, most ASIO-compatible audio cards are capable of operating with very low latencies. Also, all VST applications are designed to compensate for latency during playback, making the playback timing tight.

However, the latency time of a VST System Link network is the total latency of all the ASIO cards in the system added together. Therefore it is extra important to minimize the latency times for each computer in the network.

⇒ The latency does *not* affect the synchronization – it is always perfectly in time. But it can affect the time it takes to send and receive MIDI and audio signals, or make the system seem sluggish.

To adjust the latency of a system, you adjust the size of the buffers in the ASIO control panel – the lower the buffer size, the lower the latency. It is best to keep to fairly low latencies (buffer sizes) if your system can handle it – about 12ms or less is usually a good idea.

Setting up your software

Now it is time to set up your programs. The procedures below describe how to set things up in Nuendo. If you are using another program on the other computer, please refer to its documentation.

Setting the sample rate

The projects in both programs must be set to use the same sample rate. Select “Project Setup...” from the Project menu and make sure that the sample rate is the same in both systems.

Streaming digital audio between applications

1. Create input and output busses in both applications and route these to the digital inputs and outputs.

The number and configuration of the busses depend on your audio hardware and on your needs. If you have a system with eight digital i/o channels (such as an ADAT connection), you could create several stereo or mono busses, a surround bus together with a stereo bus, or any combination you need. The important thing is that you should have the same configuration in both applications – if you have four stereo output busses on computer 1, you want four stereo input busses on computer 2, etc.

2. Set things up so that computer 1 plays back some audio.

For example, you could import an audio file and play it back in Cycle mode.

3. In the Inspector or Mixer, make sure that the channel containing the audio material is routed to one of the digital output busses.

4. On computer 2, open the Mixer and locate the corresponding digital input bus.

The audio being played back should now “appear” in the program running on computer 2. You should see the input bus level meters moving.

5. Reverse this procedure so that computer 2 plays back and computer 1 “listens”.

Now you have verified that the digital connection works as it should.

⇒ From this point on in this chapter, we refer to the busses connected to the digital inputs and outputs as “VST System Link busses”.

Settings for the audio hardware

When you exchange VST System Link data between computers, it is important that the digital information is not changed in any way between the programs. Therefore, you should open the control panel (or additional application) for your audio hardware and make sure that the following conditions are met:

- If there are additional “format settings” for the digital ports that you use for VST System Link data, make sure that these are turned off.

For example, if you are using an S/PDIF connection for VST System Link, make sure that “Professional format”, Emphasis, and Dithering are turned off.

- If your audio hardware has a mixer application allowing you to adjust the levels of digital inputs and outputs, make sure that this mixer is disabled or that the levels for the VST System Link channels are set to ± 0 dB.

- Similarly, make sure no other forms of DSP (pan, effects, etc.) are applied to the VST System Link signal.

Notes for Hammerfall DSP users

If you are using RME Audio Hammerfall DSP audio hardware, the Totalmix function allows for extremely complex signal routing and mixing in the audio hardware. This can in some situations lead to “signal loops” in which case the VST System Link will not work. If you want to make absolutely sure this will not cause any problems, select the default or “plain” preset for the Totalmix function.

Activating VST System Link

Before you proceed, you need to make sure that VST System Link is set as the timecode source in the Project Synchronization Setup dialog and that the desired Sync options are activated, see [“Timecode Preferences” on page 503](#).

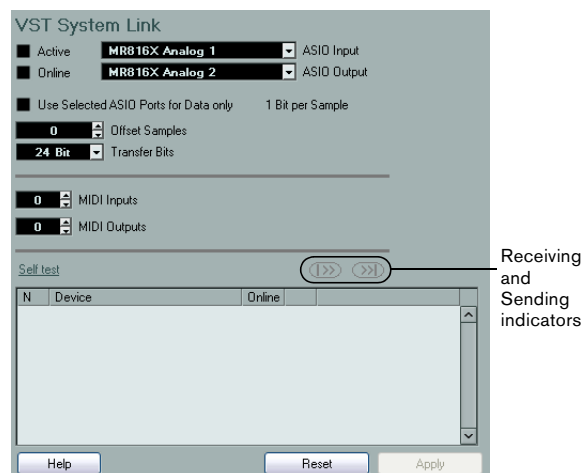
After setting up the inputs and outputs, you now need to define which input/output will carry the actual VST System Link information.

The VST System Link networking signal is carried on only one bit of one channel. This means that if you have an ADAT-based system which normally carries eight channels of 24-bit audio, once you activate VST System Link you will have seven channels of 24-bit audio and one channel of 23-bit audio (the least significant bit of this last channel will be used for networking). In practice this makes no discernible difference to the audio quality, since you will still have around 138dB headroom on this channel.

To set things up, open the VST System Link panel:

1. From the Devices menu, open the Device Setup dialog.
2. In the Devices list to the left, select the “VST System Link” entry.

The VST System Link settings are shown to the right of the Devices list.



3. Use the ASIO Input and ASIO Output pop-up menus to define which channel is the networking channel.
4. Activate the Active checkbox at the top left of the panel.
5. Repeat the steps above for every computer in the network.

As the computers are made active, you should see the Sending and Receiving indicators flashing on each active computer, and the name of each computer should appear in the list at the bottom of the pane. Each computer is assigned a random number – do not worry about this, it is just so the network knows internally which one is which.

- You can double-click on the name in bold (which is the name of the computer you are currently working on) and set it to whatever other name you wish.

This name will appear in the VST System Link window of every computer on the network.

⇒ If you do not see the name of each computer appearing once you have made it active, you need to check your settings. Go through the procedure above again and make sure that all ASIO cards are listening to the digital clock signals correctly, and that each computer has the correct inputs and outputs assigned to the VST System Link network.

Putting the network online

After each computer's name you will see whether it is online or not. When a computer is online, it will receive transport and timecode signals, and its sequencer application can be started and stopped by remote control. If it is offline, it can only be started from its own keyboard – it is effectively an independent machine, although it is still on the network.

⇒ Note that any computer can control any and all of the others – VST System Link is a peer-to-peer network and there is no absolute “master” computer.

To put all computers online, proceed as follows:

1. For all computers, activate the Online checkbox on the VST System Link page.
2. Start playback on one computer to check that the system is working – all computers should start almost instantly and play perfectly in time, with sample-accurate precision.

- The Offset Samples setting allows you to adjust whether one machine will play slightly ahead or behind the rest.

This is normally not needed, but occasionally with some hardware you may find that the lock is a few samples out. For now, leave it set to 0 – it will most likely be what you want.

- The Transfer Bits setting allows you to specify whether you want to transfer 24 or 16 bits. This allows you to use older audio cards which do not support transfer of 24 bits.

VST System Link sends and understands all transport commands (such as play, stop, fast forward, rewind, etc.). This allows you to control the entire network from one computer without a problem – try it! If you jump to a locator point on one machine, all other machines will also instantly jump to that locator point.

⚠ Make sure that all computers have their tempos set to the same value, otherwise your synchronization will be seriously skewed.

Scrubbing via VST System Link

You can scrub on one computer and have the video and audio on another computer scrub along. However, the playback on the linked systems may not be perfectly in sync while scrubbing and there are some further restrictions you should bear in mind when scrubbing via VST System Link:

- Use the jog/shuttle control on the Transport panel or a remote controller for scrubbing.

Scrubbing with the Scrub tool does not work over a VST System Link connection.

- Always use the system where you started scrubbing to control the scrubbing, e.g. change the scrub speed or stop scrubbing.

Changing the scrub speed on a remote system will only change the speed on the local system.

- You can start playback on all systems.

This stops scrubbing and enters playback on all systems in sync.

Using MIDI

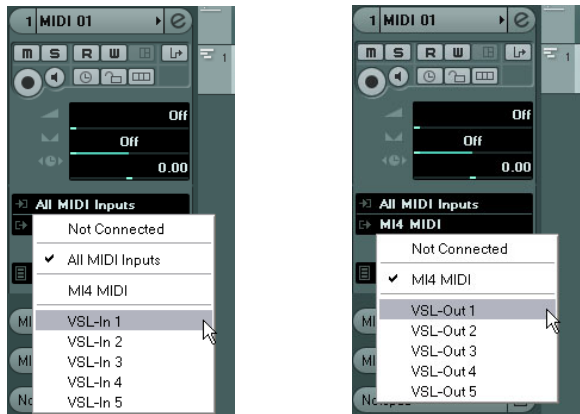
As well as supplying transport and sync control, VST System Link also supplies up to 16 MIDI ports, with 16 channels each. To set this up, proceed as follows:

1. Use the MIDI Inputs and MIDI Outputs value fields to specify the number of MIDI ports you need.

The default value is 0 MIDI In and 0 MIDI Out ports.

2. In the Project window, create a MIDI track and open the Inspector (top section).

3. If you now pull down the Input or Output Routing pop-up menu, you will find the specified System Link ports added to the list of MIDI inputs or outputs.



This allows you to route MIDI tracks to VST instruments running on another computer, as described in the application examples (see [“Using one computer for VST instruments”](#) on [page 518](#)).

The “Use Selected ASIO Ports for Data only” setting

If you are sending huge amounts of MIDI data at once, there is a small possibility that you might run out of bandwidth on your VST System Link network. This will manifest itself by notes “choking” or timing becoming erratic.

If this happens, you can devote more bandwidth to MIDI by activating the “Use Selected ASIO Ports for Data only” option on the VST System Link page of the Device Setup dialog. When this is activated, the VST System Link information will be sent on the entire channel instead of just one bit, more than enough for all the MIDI you could ever hope to use. The downside is that you can no longer use this ASIO channel for audio transfer (do not connect it to a speaker!), thus leaving you with only 7 audio channels in our ADAT cable example. Depending on how you work, this might be a reasonable compromise.

Hearing the network audio

If you are using an external mixing desk, hearing your audio really is not an issue – just plug the outputs of each computer into the desired channels on the external mixing desk, start playback on one of the computers, and you are good to go.

However, many people prefer to mix internally inside the computer and just use a desk for monitoring (or maybe not use any external mixer at all). In this case you will need to select one computer to be your “main mix computer” and send the audio from your other computers into this.

In the following example, we assume you are using two computers, with computer 1 as your main mix computer and computer 2 running two additional stereo audio tracks, an FX channel track with a reverb plug-in and a VST instrument plug-in with stereo outputs.

Proceed as follows:

1. Set things up so that you can listen to the audio playback from computer 1.

In other words, you need an unused set of outputs, e.g. an analog stereo output, connected to your monitoring equipment.

2. On computer 2, route each of the two audio tracks to a separate output bus.

These should be busses connected to the digital outputs – let’s call them Bus 1 and 2.

3. Route the FX channel track to another VST System Link bus (Bus 3).

4. Route the VST instrument channel to yet another bus (Bus 4).

5. Go back to computer 1 and check the corresponding four VST System Link input busses.

If you start playback on computer 2, the audio should “appear” on the input busses on computer 1. However, to mix these audio sources you need actual Mixer channels.

6. Add four new stereo audio tracks on computer 1 and route these to the output bus you use for listening, e.g. to the analog stereo outputs.

7. For each of the audio tracks, select one of the four input busses.

Now, each computer 2 bus is routed to a separate audio channel on computer 1.

8. Activate monitoring for the four tracks.

If you now start playback, the audio from computer 2 will be sent “live” to the new tracks on computer 1, allowing you to hear them together with any tracks you play back on computer 1.

For more information about Monitoring, see [“About monitoring”](#) on [page 32](#).

Adding more tracks

What if you have more audio tracks than you have VST System Link busses (physical outputs)? Then you just use the computer 2 mixer as a submixer: Route several audio channels to the same output bus and adjust the output bus level if needed.

⇒ If your audio cards have multiple sets of input and output connections, you can link up multiple ADAT cables and send audio via any of the busses on any of the cables.

Internal mixing and latency

One problem with mixing inside the computer is the latency issue we mentioned earlier. The VST engine always compensates for record latencies, but if you are monitoring through computer 1 you will hear a processing delay while you listen to signals coming from your other computers (not on your recording!). If your audio card in computer 1 supports ASIO Direct Monitoring you should definitely turn this on. You can find the setting on the VST Audio System device panel for your hardware (see [“ASIO Direct Monitoring”](#) on [page 98](#)). Most modern ASIO cards support this function. If yours does not, you may want to change the Offset Samples value on the VST System Link page to compensate for any latency issues.

Setting up a larger network

Setting up a larger network is not much more difficult than a two-computer network. The main thing to remember is that VST System Link is a daisy chain system. In other words, the output of computer 1 goes to the input of computer 2, the output of computer 2 goes to the input of computer 3, and so on around the chain. The output of the last computer in the chain must always go back into the input of computer 1, to complete the ring.

Once you have done this, the transmission of all the transport, sync, and MIDI information to the whole network is handled pretty much automatically. However, where you may run into confusion in a large network is in the transmission of audio signals back to a central mix computer.

If you have lots of hardware inputs and outputs on your ASIO cards, you do not have to send audio via the chain at all, but can transmit it directly to the master mix computer via one or more of its other hardware inputs. For example, if you have a Nuendo Digiset interface or 9652 card on computer 1, you could use ADAT cable 1 for networking, ADAT cable 2 as a direct audio input from computer 2, and ADAT cable 3 as a direct audio input from computer 3.

You can also transmit audio via the ring system if you do not have enough hardware I/Os for direct audio transmission. For example, in a four-computer scenario you could send audio from computer 2 into a channel in the Mixer in computer 3, from there to a channel in the Mixer in computer 4, and from there back to the master Mixer in computer 1. This can certainly be tricky to set up, so for complex networks it is generally recommended to use ASIO cards with at least three separate digital I/Os.

Application examples

Using one computer for VST instruments

In this example, one computer will be used as main record and playback machine, and another computer as a virtual synth rack. Proceed as follows:

1. Record a MIDI track into computer 1.
2. Once you have finished recording, route the MIDI output of that track to VST System Link MIDI port 1.
3. On computer 2, open up the VST Instrument rack and assign an instrument to the first slot in the rack.
4. Route the VST instrument channel to the desired output bus.
If you are using computer 1 as your main mixing computer, this would be one of the VST System Link output busses, connected to computer 1.
5. Create a new MIDI track in the Project window of computer 2 and assign the MIDI output of the track to the VST instrument you created.

6. Assign the MIDI input of the track to be VST System Link port 1.

Now, the MIDI track on computer 1 is routed to the MIDI track on computer 2, which in turn is routed to the VST instrument.

7. Now activate monitoring for the MIDI track on computer 2, so that it will listen and respond to any MIDI commands coming in.

In Nuendo, click the Monitor button in the track list or Inspector.

8. Start playback on computer 1.

It will now send the MIDI information on the track to the VST instrument loaded on computer 2.

Even with a slow computer you should be able to stack a whole bunch of extra VST instruments this way, expanding your sound palette considerably. Do not forget that VST System Link MIDI is also sample-accurate, and thus has much tighter timing than any hardware MIDI interface ever invented!

Creating a virtual effect rack

The effect sends for an audio channel in Nuendo can either be routed to an FX channel track or to any activated group or output bus. This allows you to use a separate computer as a "virtual effect rack", by setting the system up as follows:

1. On computer 2 (the machine you will use as effect rack), add a new stereo audio track.
You cannot use an FX channel track in this case, since the track must have an audio input.
2. Add the desired effect as an insert effect for the track.
Let's say you add a high-quality reverb plug-in.
3. In the Inspector, select one of the VST System Link busses as input for the audio track.
You want to use a separate VST System Link bus, which will only be used for this purpose.
4. Route the channel to the desired output bus.
If you are using computer 1 as your main mixing computer, this would be one of the VST System Link output busses, connected to computer 1.
5. Activate monitoring for the track.
6. Go back to computer 1 and select a track to which you want to add some reverb.
7. Bring up the effect sends for the track in the Inspector or the Mixer.

8. Open the Send Routing pop-up menu for one of the sends and select the VST System Link bus assigned to the reverb in step 3.

9. Use the Send slider to adjust the amount of effect as usual.

The signal will be sent to the track on computer 2 and processed through its insert effect, without using any processor power on computer 1.

You can repeat the steps above to add more effects to the “virtual effect rack”. The number of effects available this way is only limited by the number of ports used in the VST System Link connection (and of course by the performance of computer 2, but given that it will not have to handle any recording or playback, you should be able to use quite a lot of effects).

Getting extra audio tracks

All computers on a VST System Link network are locked with sample-accuracy. Therefore, if you find that the hard drive on one computer is not fast enough to run as many audio tracks as you need, you can record new tracks on one of the other computers instead. This would create a “virtual RAID system”, with several disks all operating together. All tracks will remain locked together just as tightly as if they were all running on the same machine. This means that you effectively have an unlimited track count! Need another 100 tracks? Just add another computer.

Dedicated Video Playback

Playback of high-resolution video can be taxing on a system's CPU. By dedicating one computer for video playback via System Link, you can free up resources on your main CPU for audio and MIDI processing. Since all transport commands will respond on the VST System Link computers, scrubbing video is possible even when it is coming from another computer. Spotting sound effects to picture in Edit Mode will work the same way as it does on one computer. This is a viable and economic alternative to dedicated hard disk video systems like the Doremi V1.

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Video

Introduction

Nuendo is a full-featured postproduction media tool that is capable of dealing with video content in several ways. You can work with video and create complete soundtracks from within Nuendo. The soundtrack can then be inserted into a video file, recorded onto video tape or exported as an audio file that can be married to the video or film later. This chapter covers the video operations related to the video itself, like importing video files, playing back video, and applying speed changes to compensate for film transfers. How to create a soundtrack for a video file is described in the chapter [“Audio editing to picture”](#) on [page 535](#).

Before you start

When working on a project involving a video file, you first need to set up your system according to your equipment and your demands. The following sections provide some general information about video file formats, frame rates, and video output devices.

Video file compatibility

Because there are many types of video files, it can be difficult to determine if one will work on your system. There are two ways to figure out if Nuendo can play back a certain video file:

- Open the video file with QuickTime 7.1 or higher, because Nuendo uses QuickTime for playing back video files.
- Check the file information of a video file in the Pool. If the information reads “Invalid or not supported file!”, the video file is either corrupt or the format is not supported by the available codecs.

⚠ If you are not able to load a certain video file, you must use an external application to convert the file into a compatible format or install the required codec. For more information on codecs, see the section [“Codecs”](#) on [page 521](#).

Video container formats

Video and other multi-media files come in a container format. This container holds various streams of information including video and audio, but also metadata such as synchronization information required to play back audio and video together. Data regarding creation dates, authors, chapter markings, and more can also be held within the container format. The following container formats are supported by Nuendo:

Format	Description
MOV	This is a QuickTime movie.
QT	This is also a QuickTime movie, but it is only used in Windows.
MPEG-1	This is the first standard of the Moving Picture Experts Group for video and audio compression, used for making video CDs. Files of this container format can have the extensions “.mpg” or “.mpeg”.
MPEG-2	This container format is used for DVD authoring. It can also contain AC3 multi-channel audio and has the file extension “.m2v”.
VOB	This format is used for DVD video and is based on MPEG-2, but has additional limitations and specifications.
MPEG-4	This format is based on the QuickTime movie standard, can contain various metadata for streaming, editing, local playback, and interchange of content. Its file extension is “.mp4”.
AVI	This format is a multimedia container format introduced by Microsoft.
DV	This is a video format used by camcorders.

Nuendo supports all these container formats, but problems may arise when the computer does not have the correct software to decode compressed video and audio streams within the container file. You must also know the type of codec that was used to create the video file.

Codecs

Codecs are methods of data compression used to make video (and audio) files smaller and more manageable for computers. In order to play back a video file, your computer must have the correct codec installed in the operating system to decode the video stream.

⚠ The names of codecs and container formats can be confusing. Because many container formats have the same names as the codecs they use within the file, make sure to differentiate the container format or file type (e.g. .mov or .dv) from the codec used within it.

If you are not able to load a certain video file, the required codec is probably not installed on your computer. In this case, you can search the Internet (e.g. the Microsoft or Apple web sites) for video codecs.

Frame rates

Nuendo is capable of working with different types of video and film frame rates. For an overview about the supported frame rates, refer to the section [“Frame rate \(speed\)” on page 498](#).

Video output devices

Nuendo supports several ways to play back video files. Viewing video files onscreen in the Video Player window may work just fine for many applications, but often it is necessary to display video in a large format for viewing small details and so others involved in the session can also see the video. Nuendo provides the ability to use several types of video output devices to accomplish this.

Multi-head video cards

One of the most common methods is the use of a multi-head video card installed in the computer. Multi-head video cards allow you to connect more than one computer monitor to the card, in some cases up to four. If you direct the video output of Nuendo to one of these outputs, the video file is displayed in fullscreen mode on a computer monitor or HD television screen.

⇒ You can also use more than one video card to achieve the same result. The use of two dual display cards in one system (a total of four monitors) is a very common setup for film postproduction systems. One output is dedicated to video and the other three can be used for Nuendo and other applications.

Different video cards support different types of outputs including standard VGA, DVI, S-Video, HDMI, and component video. These options allow you to choose the type of monitor you use for video. HD televisions and digital projectors provide the largest viewing screens, but a normal computer monitor can function as a very high-quality video monitor as well.

Dedicated video cards

The use of a dedicated video card is also supported in Nuendo. These cards are normally used in video editing systems to capture video to disk and display it while editing. They usually have a high resolution and take some strain off the host CPU by providing video compression and decompression processing on the card.

⇒ The Decklink cards by Blackmagic Design are automatically recognized by Nuendo. Video will be sent directly to its output.

FireWire DV Output

You have the option to use FireWire ports on the computer to output DV video streams to external converters such as various camcorders and standalone FireWire to DV conversion units. These units can be connected to a television or projector for large format viewing. The FireWire protocol is capable of transporting data at high speed and is the most common standard for communicating with video-related peripheral equipment.

⚠ Under Windows, it is important that you connect your device to the FireWire port before launching Nuendo. Otherwise it may not be detected properly by Nuendo.

Preparing a video project in Nuendo

The following sections describe the basic operations necessary for preparing a Nuendo project involving video. It is advisable to store your video files on a separate hard drive from your audio files. This can help prevent data streaming problems when using high-resolution video with many audio tracks.

Importing video files

Importing a video file into your project is very straightforward once you know that you have a compatible video file.

Video files are imported in the same manner as audio files:

- By using the File menu (Import–Video File).

In the Import Video dialog, you can activate the “Extract Audio From Video” option. This imports any embedded audio streams to a newly created audio track positioned below the video track. The new track and the clip will get the name of the video file. The new audio event will start at the same time as the video event, so that they are in sync with each other. If there is no audio stream within the container file, you will get the error message “No compatible audio stream found in file”. Click OK and the video stream will continue to be imported.

⇒ If you try to import a non-supported video file with the Import Video option, the Import Video dialog displays the text “Invalid or not supported file!”.

- By importing to the Pool first and then dragging to the Project window (see [“The Pool”](#) on [page 320](#) for details).
- By using drag and drop from the Windows Explorer, the Mac OS Finder, the Pool, or the MediaBay.

⇒ When importing video files via the Pool or by using drag and drop, Nuendo can automatically extract the audio from a video file. Whether this happens, depends on the “Extract Audio on Import Video File” setting in the Preferences dialog (Video page). For further information about extracting audio from a video file, see [“Extracting audio from a video file”](#) on [page 528](#).

⇒ When importing video, Nuendo automatically creates a thumbnail cache file. The generated file is stored in the same folder as the video file and gets the name of the file with the suffix “.vcache”.

⚠ In Nuendo, you may work with multiple video files of differing frame rates and formats on the same video track. There can be two video tracks per project. Assuming you have the proper codecs installed, all video files can be played back in one project, but note that proper synchronization of audio and video events is ensured only if the frame rate of the video file matches the project frame rate (see below).

Adopting the video frame rate

When using video files within Nuendo, it is important to adjust the project's frame rate to that of the imported video. This ensures that the time displays of Nuendo correspond to the actual frames in the video. If the frame rate of an imported video file differs from the frame rate set for the project, the video event shows a warning.



In order to match the two frame rates, you have to adjust the frame rate in the Project Setup dialog.

To adopt the video frame rate, proceed as follows:

1. Pull down the Project menu and select “Project Setup...”.
2. In the Project Setup dialog, click the “Get From Video” button.

Provided that the video file has a frame rate supported by Nuendo, it is automatically detected and applied to the project. If the project contains several video files with different frame rates, the project frame rate is adjusted to the frame rate of the first video event on the upper video track.

The project frame rate setting will change to that of the video file and the project start time will be altered to reflect the change in frame rate if needed. For example, when the project frame rate is switched from 30 fps to 29.97 fps, the start time is changed so that all the events currently in the project remain at the same positions in relation to realtime. If you want the project start time to remain the same, you

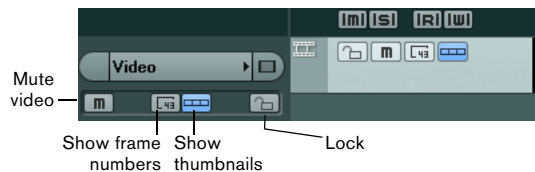
must manually change it back after clicking the “Get From Video” button. In this case, it is important that the video event is snapped to the timeline to ensure proper positioning and synchronization within the project.

⇒ Nuendo can only detect the supported frame rates (these are the frame rates listed in the Frame Rate pop-up menu in the Project Setup dialog). Video files with non-supported frame rates can be played back, but the time displays are not correct in this case and proper positioning is not guaranteed. Furthermore, audio and video may not be in sync. Therefore, we recommend that you use an external application to convert the video file to a frame rate supported by Nuendo.

If you have more than one video file in a project, it is advisable that all video files have the same frame rate consistent with the project frame rate. Nevertheless, you can work with multiple video files of differing frame rates, but in this case you should always change the project frame rate to the frame rate of the video file that you are editing at the moment. This is done in the Project Setup dialog by selecting the correct frame rate from the Frame Rate pop-up menu.

Video files in the Project window

Video files are displayed as events/clips on a video track, with thumbnails representing the frames in the film. There can be two video tracks per project.



In the track list and Inspector, you find the following buttons:

Button	Description
Mute Video	When this is activated, video playback is disabled, but playback of any other events in the project continues. This increases the performance of Nuendo when realizing operations that do not require watching the video.
Show Frame Numbers	When this is activated, each thumbnail is shown with the corresponding video frame number.
Show Thumbnails	With this button you can activate/deactivate the thumbnails of a video track.
Lock	When this is activated, the video event will be locked, see the section “Locking events” on page 74 .

⇒ Some of these buttons may not be visible in the track list. With the Track Controls Settings dialog you determine which buttons are displayed in the track list, see the section [“Customizing track controls”](#) on [page 573](#).

About thumbnails

The individual thumbnail images are positioned exactly at the beginning of the corresponding frame. When you zoom in and there is enough space between the frames, the thumbnail is repeated as many times as there is free space available. Thus, you can always see a thumbnail regardless of how much you zoom in.

Thumbnail Memory Cache Size

In the Preferences dialog on the Video page, you can enter a value for the “Thumbnail Memory Cache Size”. This determines how much memory is available for displaying “real” thumbnails. The currently shown image is buffered in the thumbnail memory cache. Whenever you move to another image and there is no memory capacity left, the “oldest” picture in the cache is replaced by the current one. If you have long video clips and/or work with a large zoom factor, you may have to raise the “Thumbnail Memory Cache Size” value.

About thumbnail cache files

When importing video, Nuendo automatically creates a thumbnail cache file. The cache file is used in situations where the processor load is very high and the correct re-drawing or realtime calculation of thumbnails might use system resources necessary for editing or processing. When you zoom in on the thumbnails, you see that they are in a lower resolution, i.e. the pictures are not as clear

as when they are calculated. When the processes that rely heavily on the computer CPU are finished, the frames are automatically recalculated, i.e. the program automatically switches between realtime calculation of the pictures and using the cache file.

⇒ There are situations where no thumbnail cache file can be generated, e.g. if you import a video file from a folder that is write-protected. If you have access to the host folder at a later stage, you can generate a thumbnail cache file manually.

Manually generating thumbnail cache files

If no thumbnail cache file could be generated during import or if you have to “refresh” a thumbnail cache file of a certain video file, because the file has been edited with an external video editing application, you have the possibility to generate the thumbnail cache file manually.

To create a thumbnail cache file manually, you have the following possibilities:

- In the Pool, right-click on the video file that you want to create a thumbnail cache file for and select the “Generate Thumbnail Cache” option from the context menu.
A thumbnail cache file is created, or, in case there already existed a thumbnail cache file for the video file, it is “refreshed”.
- In the Project window, open the context menu for the video event, and select “Generate Thumbnail Cache” from the Media submenu.
- Pull down the Media Menu and select “Generate Thumbnail Cache”.

⇒ “Refreshing” an already existing thumbnail cache file can be done only from within the Pool.

⇒ The thumbnail cache file is generated in the background so that you can continue working with Nuendo.

Playing back video

⚠ For playing back video files, you must have QuickTime 7.1 or higher installed on your computer. There is a freeware version and a “pro” version, which offers additional video conversion options. The player engine is the same in both versions, so for mere playback in Nuendo there is no need to purchase the “pro” version.

⚠ You need a video card that supports OpenGL (version 2.0 recommended) for proper video playback. A card with OpenGL 1.2 can also be used, but might put restrictions on the video functionality.

To check if your video equipment is capable of playing back a video from within Nuendo, open the Video Player page in the Device Setup dialog. If your system does not meet the minimum video requirements, a corresponding message will be displayed. For further information on the Device Setup dialog, see below.

Video is played back together with all other audio and MIDI material, using the Transport controls. If you work with two video tracks in your project, the file on the lower track is played back. To watch a video file that is positioned on the upper video track, change the order of the tracks or mute the lower video track.

Video settings in the Device Setup dialog

In the Device Setup dialog you determine which device is used for playing back video files. You can switch between different output devices during playback.

Video Player			
Device	Format	Offset (ms)	Active
Onscreen Window	Fixed	0	<input checked="" type="checkbox"/>
Blackmagic Video Output	Blackmagic PAL - RGB, 720x576	0	<input type="checkbox"/>

The Video Player page in the Device Setup dialog

To set up a video output device, proceed as follows:

1. Pull down the Devices Menu and select “Device Setup...” to open the Device Setup dialog, and select the Video Player page.

2. In the Active column, activate the checkbox for the device that you want to use for playing back video.

All devices in your system that are capable of playing back video are listed. The Onscreen Window device serves for playing back the video file on your computer monitor. For further information on output devices, see the section “[Video output devices](#)” on [page 522](#).

3. From the pop-up menu in the Format column, select an output format.

For the Onscreen Window output, only a “fixed” format is available. For the other output devices, you can select different output formats for playback depending on the device.

4. Adjust the Offset setting to compensate for processing delays.

Due to delays while processing video, the video image may not match with the audio in Nuendo. By using the Offset parameter, you can compensate for this effect. The Offset value indicates how many milliseconds the video will be delivered earlier in order to compensate for the processing time of the video material. Each hardware setup can have different processing delays, so you must try out different values to determine which value is appropriate.

⇒ The Offset value can be set individually for each output device. It is saved globally for each output device and is independent of the project.

⇒ The offset is only used during playback. It is defeated in stop and scrub mode so that you always see the correct video frame.

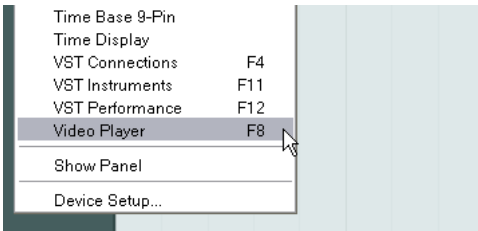
▪ If the quality of the video image is not a critical factor or if you are experiencing performance problems, try lowering the value on the Video Quality pop-up menu.

Although higher quality settings make the video display sharper and smoother, they also lead to an increased processor load.

Playing back video on the computer screen

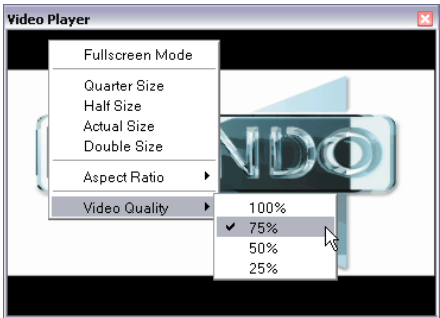
The Video Player window is used for playing back video on your computer screen.

▪ To open the Video Player window, pull down the Devices menu and select Video Player.



Setting the window size and video quality

To resize the Video Player window and/or change the playback quality of the video, select the appropriate option on the context menu of the Video Player window.



The following options are available:

Option	Description
Fullscreen Mode	The window is enlarged to occupy the whole (computer) screen. If you are working with more than one monitor, you can move the Video Player window to an extra monitor. Thus, you can work with Nuendo on one monitor and let the video play back on another monitor. You can exit fullscreen mode via the window's context menu or by pressing [Esc] on your computer keyboard.
Quarter Size	The window size is reduced to a quarter of the actual size.
Half Size	The window size is reduced to half the actual size.
Actual Size	The window size corresponds to the size of the video.

Option	Description
Double Size	The window is enlarged to twice the actual size.
Video Quality	This submenu allows you to change the quality of the video image. Higher settings make the video display sharper and smoother, but lead to an increased processor load.

- Drag the borders, just like when resizing other windows.
 - ⇒ The higher the resolution, the more processing power is needed for playback. If you need to reduce the processor load, you can reduce the size of the Video Player window, or lower the value on the Video Quality submenu.

Setting the aspect ratio

Resizing the Video Player window by dragging its borders may lead to a distorted image. To prevent this, you can set an aspect ratio for video playback.

- From the Aspect Ratio submenu of the Video Player context menu, select one of the following options:

Option	Description
None	The aspect ratio of the video is not kept when resizing the window. The image is enlarged/reduced to occupy the whole Video Player window.
Internal	The Video Player window can be resized at will, but the aspect ratio of the video is kept and black borders are displayed around the video image to fill the window.
External	The resizing of the Video Player window is limited according to the aspect ratio of the video image, i.e. the video image always fills the full window and its aspect ratio is kept.

- ⇒ When the video is played back in fullscreen mode, the aspect ratio of the video is always kept.

Scrubbing video

You can scrub video events, i.e. play them back forwards or backwards at any speed. This is done by clicking in the Video Player window and moving the mouse to the left or to the right.

You can also use the Scrub controls on the Transport panel or a jog wheel on a remote controller for scrubbing video events, see the sections [“The shuttle speed control”](#) on [page 87](#) and [“Project scrubbing – the jog wheel”](#) on [page 87](#).

Editing video

Video clips are played back by events just as audio clips are. You can use all the basic editing operations on video events, just as with audio events. You can take a single event and copy it many times for the creation of mix variations. A video event may also be trimmed using the event handles to remove a countdown for instance. Furthermore, you can lock video events just like other events in the Project window, and you can edit video clips in the Pool (see the chapter [“The Pool”](#) on [page 320](#)).

It is not possible to fade or crossfade video events. Furthermore, you cannot use the Draw, Glue, and Mute tools with a video event.

- ⇒ Windows only: If you find that you are unable to edit a video file copied from a CD, this might be due to the fact that files copied from CD are write-protected by default. To remove the write-protection, in the Windows Explorer, open the Properties dialog and deactivate the “Read-Only” option.

About the Edit Mode

When you are editing audio material to a video, it is important to know how each audio edit relates to the exact frame of video where it occurs. Video playback follows the Nuendo transport, i.e. the video frame at the current project cursor position is shown in the Video Player window. However, if you perform event or range-based editing tasks you will get no visual feedback. The special Edit Mode solves this problem, allowing you to edit audio while getting continuous visual feedback on the video display. For further information on the Edit Mode, see the section [“Edit Mode”](#) on [page 545](#).

Extracting audio from a video file

If a video file contains audio, the audio stream can be extracted. As always when importing audio material, a dialog is displayed allowing you to select different import options (see the section “[Audio file import options](#)” on [page 64](#)). The extracted audio stream is added to the project on a new audio track and can be edited like all other audio material, see the chapter “[Audio editing to picture](#)” on [page 535](#).

There are several ways to extract audio from a video file:

- By activating the “Extract Audio From Video” option in the Import Video dialog (see the section “[Importing video files](#)” on [page 523](#)).

- By using the “Audio from Video File” option on the Import submenu of the File menu.


This will insert an audio event starting at the project cursor position on the selected audio track. If no audio track is selected, a new one will be created.

- By activating the “Extract Audio on Import Video File” option in the Preferences dialog (Video page).

This will automatically extract the audio stream from any video file during import.

- By using the “Extract Audio from Video File” option on the Media menu.

This creates an audio clip in the Pool, but does not add any events to the Project window.

 These functions are not available for MPEG-1 and MPEG-2 video files.

Replacing the audio in a video file

Once you have edited all audio and MIDI data to the video and created a final mix (see the chapter “[Audio editing to picture](#)” on [page 535](#)), you will need to put the new audio back with the video. You can do this by embedding the audio in another stream within the video container file.

To replace the audio stream in a video file, proceed as follows:

1. Place the left locator at the start of the video file in Nuendo. This will ensure that your audio and video streams are synchronized.

2. Pull down the File menu and select the Audio Mixdown option from the Export submenu to export the audio file you wish to insert into the video container file (for detailed information on this function, see the chapter “[Export Audio Mixdown](#)” on [page 473](#)).

3. From the File menu, select “Replace Audio in Video File...”.

A file dialog opens prompting you to locate the video file.

4. Select the video file and click Open.

Next, you are prompted to locate the corresponding audio file. This should be the one you created above.

5. Select the audio file and click Open.

The audio is added to the video file, replacing its current audio stream.

Once the process is completed, open the video file in a native media player and check for proper synchronization.

About film transfers

When working on film projects, video postproduction editors typically transfer the film footage to video for use with computer video editing systems. Once the film has been edited, it can be transferred back to film for presentation in theaters or may remain in video format for television broadcast and release on videotape or DVD.

Pull-up and pull-down

When film footage is transferred to video, the frame rate must be converted from 24fps to either 25fps (PAL/SECAM) or 29.97fps (NTSC). This process introduces a slight speed change as a result of the mathematical relationships between the different frame rates.

When a specific speed change is applied to either audio or video, this is called a “pull-down” or “pull-up” depending on the direction of the change. The specific amount and direction depend on the type of transfer the film underwent. For example, transfers to PAL/SECAM and NTSC each require a different speed change in order to keep the audio in sync.

The film to NTSC conversion is done as a 2-3 pull-down and the film is running at 23.98fps to maintain the exact 2:3 relationship. As a result the film is running ~0.1% slower in NTSC TV.

These speed changes must also be applied to the audio recorded along with the film, in order for the audio to remain in sync with the picture. Sometimes the speed change is applied at the same time as the film transfer and is recorded directly on the videotape. This allows the video editor to hear the audio along with the transferred video while editing.

However, speed changes also result in pitch changes. Furthermore, this may lead to artifacts in the audio, due to the fact that a direct digital transfer from the field recorder to videotape is not possible without performing either a sample rate conversion or an analog transfer.

Therefore, most audio engineers prefer to use the original source material when working with film audio. Once the original audio has been digitally transferred into Nuendo, the speed change must be compensated for in order to keep the audio in sync with the video. Nuendo has the

flexibility to apply these speed changes independently to either the audio or video. Both methods are described in detail in the section [“Compensating for speed changes in Nuendo”](#) on [page 531](#).

The telecine process

A telecine machine is the device used to transfer film to videotape. It transfers images from each frame of film to frames of video in a very specific way. Having a clear understanding of this process will help alleviate the confusion surrounding pull-up and pull-down sample rates and keeping film audio in sync.

Film frames vs. video fields

One of the first things that needs to be understood is how video signals are formatted in general. Each frame or single image of a video signal is composed of two video “fields”, each containing half of the image. The first field contains all the odd horizontal lines of resolution and the second field contains the even horizontal lines of the image. This is called “interlacing” and is needed to minimize the flicker effect that would result if the image was presented all at once.

Because the film frame is a single, complete image (like a 35mm photograph), there are no fields involved. The telecine machine must transfer part of the film image to one field and then the rest to another field of video. This may sound simple at first but as you will see, it can become quite complex.

Transferring film to PAL/SECAM video

Film transfers to PAL/SECAM video are relatively straightforward. Film runs at 24fps and PAL video runs at 25fps. If you speed up film by roughly 4% (or 4.16%, to be precise), it will be running at 25fps. So, film transfers to PAL video result in a 4% “pull-up” in speed. The audio must also be pulled up by 4% in order to remain in sync with the video.

When properly done, the first frame of film will be transferred to both fields of the first frame of video and so on. All that is needed is the 4% increase in speed for this to be a one-to-one transfer.

⚠ The only downside to PAL transfers is that a 4% increase in the speed will result in a 4% increase in the pitch as well! This could affect the perception of a character's delivery of a line or the timbre of sound effects or musical tonalities. If the final project is to remain in the video format, pitch-correcting this anomaly might be necessary.

If the project is going to be returned to film for the final presentation, the audio can be slowed back down to normal speed when transferring back to film in order to preserve the fidelity and performance values of the original material.

Transferring film to NTSC video

Transferring film at 24fps to NTSC video at 29.97fps presents a few more difficulties than the PAL transfer. Simply speeding up film to 29.97fps would cause both the visual and audio elements to become too fast and high-pitched to be usable. There is no neat mathematical relationship between 24fps and 29.97fps. Another method was devised called the 2-3 pull-down.

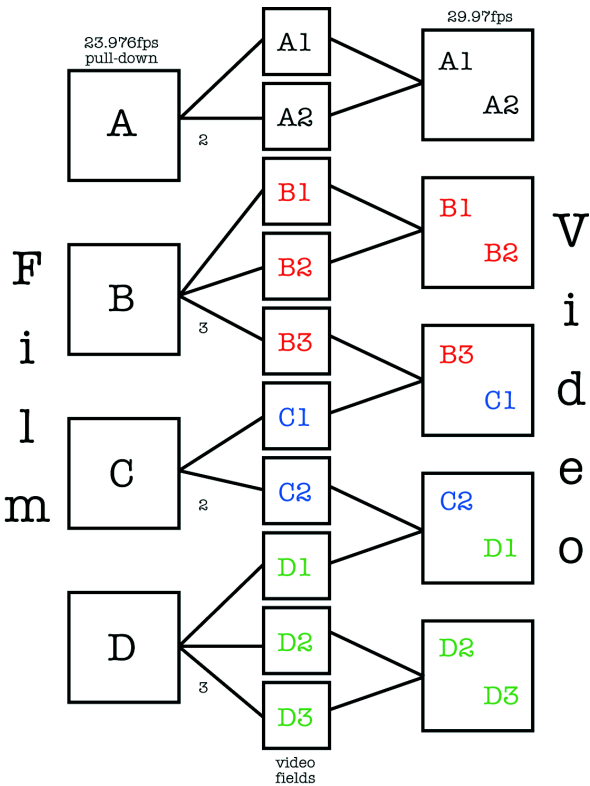
What is 2-3 pull-down?

The 2-3 pull-down is a combination of speed change and frame-to-field-counting that results in a smooth transfer to NTSC video without any unwanted or noticeable pitch changes in the audio. Here are the steps involved during the process:

1. The film speed is slowed or “pulled” down to 23.976fps (-0.1%).
2. The first frame of film is transferred to the first two fields of video.
3. The second frame of film is transferred to three fields of video, the two fields of the second video frame and just the first field of the third video frame.

This is where the “2-3” part of the name comes from. Each alternating frame of film is transferred to two fields of video, then three fields of video, and so on.

4. The third film frame is transferred to the second field of video frame three and the first field of video frame four.



This is a block diagram of the 2-3 pull-down process. Notice that 4 frames of film are transferred to 5 frames of video using the 2-3 field technique.

5. The remaining film frames are transferred in this manner, alternating between 2 and 3 fields of video, until the end of the transfer.

After four frames of film have been transferred this way, an even five video frames will be created. Over the course of one second, 24 frames of film and 30 frames of video will have gone by. Because they are running at -0.1%, the actual frame rate is 29.97 video frames per second, the NTSC standard.

It is important to have a clear understanding of 2-3 pull-down in order to make accurate decisions regarding audio pull-down and video pull-up when working with NTSC film transfers in Nuendo.

Film speed is faster than NTSC video speed. When the audio is pulled down, it allows production audio (DAT tapes or files from a field recorder) from a film shoot to play back in sync with NTSC video. Even though 29.97 fps is a faster frame rate than 24 fps (film speed), the video is running -0.1 % slower than the original film due to the 2-3 transfer process and hence the need to slow the audio down a bit.

⚠ Many video editors working with NTSC video refer to 30fps as “film speed” as opposed to 24fps. The reason for this is, if you speed NTSC video (29.97fps) up by 0.1 %, you are running at the same speed as the original film at 24fps. Conversations regarding this can often get very confusing. Make sure that you have a clear understanding of the material you are working with when dealing with film transfers and frame rates. It will avoid many mistakes and save time in the long run.

Compensating for speed changes in Nuendo

In Nuendo, there are two basic ways to compensate for speed changes due to film transfers. The first is by adjusting the playback speed of the audio to match the speed of the video. The second is to adjust the speed of the video file to match the original speed of the film and production audio in Nuendo.

Adjusting audio playback speed

When adjusting audio playback speed to match the video, there are two scenarios based on the two video formats that film is transferred to, NTSC and PAL/SECAM. Because the telecine process for each video format results in different speed changes, there are two types of playback adjustments possible. For NTSC, the speed change is down -0.1 %. For PAL/SECAM, the change is up +4.1667 %.

Audio pull-down -0.1% (NTSC)

When working on a film project that has been transferred to NTSC video, most audio engineers prefer to use the original source tapes from the film shoot in order to retain the highest quality and fidelity. Audio that has been transferred to the videotape during the film transfer has suffered a generation loss and speed change.

Because the video is running -0.1 % slower than the original film, the audio must also be slowed down by the same amount as the film in order to remain in sync.

In most cases, to slow down audio playback in Nuendo, an external sample clock source will be needed to “pull” the clock speed down by 0.1 %.

For this to work, your audio card must be set to external sync and connected to the clock device via word clock, VST System Link, or some other clocking method. Furthermore, you have to “tell” Nuendo that it is being synchronized with an external clock source. This is done in the Device Setup dialog, see [“Selecting a driver and making audio settings in Nuendo”](#) on page 19.

Because video and audio playback speeds are independent in Nuendo, the video will remain at the same speed while the audio is slowed down (pulled down). This ensures that the production audio and film transfer remain in sync.

Either you receive an OMF, AES 31, or OpenTL file that contains audio from the original source tapes conformed to the edited video or you have to record the source tapes into Nuendo yourself. In both cases, you have audio in Nuendo that is edited to the picture but will not stay in sync with the video unless you pull down the sample rate.

⚠ When Nuendo is running at a non-standard sample rate (47.952kHz = 48kHz pull-down), digital transfers into Nuendo from external equipment must be made with the external equipment locked to the same sample clock as your audio card. Most devices are capable of a 0.1 % change in sample rate and will function normally.

⚠ Any audio mixdowns that are exported from Nuendo when the sample clock is pulled down, will play back in other applications and devices faster because that sample clock will be running at the standard 48kHz.

The idea is that when you have completed the audio mix for your film project, the video will be sped back up to film speed for the final transfer back to film and your audio mix can then be played at the standard 48kHz sample rate (no pull-down) and will remain in sync with the picture.

Using this method preserves the quality of the original audio recording made during filming and allows for a digital mixdown transfer at film speed without any generation loss or sample rate conversion.

Audio pull-up +4.1667% (PAL/SECAM)

Audio pull-up (+4.1667%) is the same concept applied to PAL/SECAM video transfers. Because the film is sped up by 4.1667% during transfer, audio in Nuendo must be running at +4.1667% speed in order to remain in sync with the video during editing and mixing.

In this case, the external clock must be set to +4% varispeed.

⚠ Steinberg's Nuendo SyncStation is capable of varispeed and has presets for the 4.1667% necessary with PAL film transfers and the -0.1% for NTSC.

Once the project is complete, Nuendo's sample rate can be returned to normal (48kHz) for the final mixdown at film speed. Once again, this allows for a digital transfer of the final master at the correct speed for theatrical presentation.

Non-standard audio pulls

It is also possible to use pulled sample rates that do not fit one of the above scenarios. These sample rates would only need to be used in exceptional circumstances when an error has occurred elsewhere in the process of making a film. These settings can be used to correct for sync errors made at another studio or problems with video editing systems. Just about anything is possible.

▪ -4% pull-down

If a film project was transferred to PAL/SECAM video and the audio editing and mixing was performed at video speed (48kHz) without using audio pull-up, the final mix would be running at video speed not film speed. In this case a -4% pull-down can be used to correct this and get the audio running at film speed again. The downside to this is that the final transfer to film would either have to be analog or through a sample rate converter in order to be recorded with the film.

▪ +0.1% pull-up

This pull-up is not normally used except in situations similar to the one described above but for NTSC video. It can be used to correct the speed of a project finished at video speed (without pull-down) prior to transferring it to film. Because film is moving 0.1% faster than NTSC video, the audio mix can be sped up to film speed using +0.1% pull-up for the transfer.

▪ Other pull-up/pull-down options

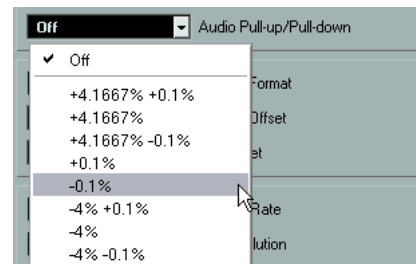
There may be other scenarios where non-standard pull-ups and pull-downs can be used to correct mistakes. Nuendo provides further pull-up/pull-down options for such situations in the Project Setup dialog and the respective section in the Project Synchronization Setup dialog (see below).

⚠ All the examples used here are with 48kHz as the standard sample rate for the film and video industry. However, it is possible to accomplish the same tasks using 44.1 kHz, 88.2kHz, 96kHz (this is double the standard sample rate and commonly used for higher fidelity), 176.4kHz and 192kHz, provided you have an external clock device capable of pulling these higher sample rates.

Adjustments in Nuendo when applying audio speed changes

When the audio clock of your audio card is being slowed down or sped up from an external clock source, Nuendo cannot know that it is running slower or faster than normal. The time displays (minutes:seconds, timecode) will become inaccurate because they are based on a sample count, not the independent clock source.

Nuendo provides an adjustment of the timeline to compensate for these changes. This setting is found in the Project Setup dialog as well as in the Project Synchronization Setup dialog in the "Project Setup - Time" section.



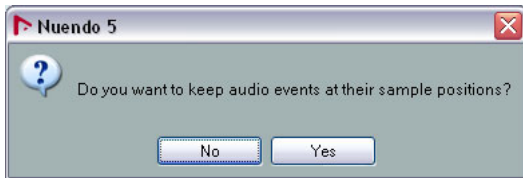
⇒ It makes no difference whether you make your Audio Pull-up/Pull-down settings in the Project Setup dialog or the Project Synchronization Setup dialog. If you use the Project Synchronization Setup dialog, your adjustment is reflected in the Project Setup dialog, and vice versa.

Whenever you apply an audio pull to Nuendo from an external clock, also set “Audio Pull-up/Pull-down” to the corresponding setting. This allows Nuendo to recalculate the sample count to reflect the adjusted sample rate.

For example, if the setting is switched from no pull-down to -0.1 % pull-down, events on the timeline will appear longer because the sample rate has been slowed down. The event display will show the accurate length of events relative to timecode, minutes, and seconds.

⇒ In the Project window, the status line below the tool-bar also indicates whether Audio pull-up or pull-down is applied to this project.

When you change the setting for Audio Pull-up/Pull-down and there are audio events in the timeline already, Nuendo prompts you to choose whether or not to keep the original sample start times.



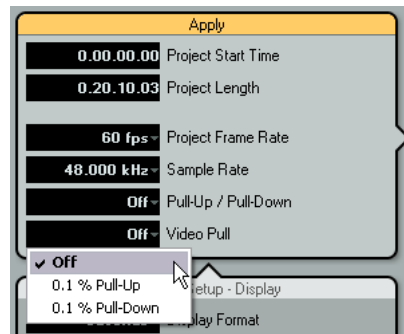
- Select No to let the events follow the timecode and minutes:seconds clock change and remain at their SMPTE start times.
- Select Yes to force Nuendo to leave events at the same sample start time regardless of the clock speed change.

Video pull-up and pull-down

Nuendo also provides a method to adjust for film transfers by speeding up or slowing down playback of the video files in your project. Depending on the situation, it can be helpful to make the video file play back at film speed and not adjust the audio playback at all.

Adjusting the video playback speed back to film reverses the process used when adjusting audio playback speed. For NTSC video, the video playback speed must be adjusted up +0.1 % back to film speed.

Altering the video playback speed is done in the Project Synchronization Setup dialog (“Project Setup - Time” section). You have two options: 0.1 % pull-up and 0.1 % pull-down.



Video +0.1% pull-up for NTSC

Because NTSC video is running -0.1 % slower than the original film, pulling the video speed back up by +0.1 %, returns it to original film speed. With the video now running at the correct film speed, audio originally recorded at 48kHz on the film shoot will remain in sync with the video. Additionally, the final mix can be digitally transferred back to film at 48kHz without the need for an analog copy or sample rate conversion.

Video -0.1% pull-down (non-standard)

Pulling the video speed down for an NTSC video is a non-standard procedure and would not happen under normal circumstances. It is possible to pull down a video file that is running at 24 fps -0.1 % so it matches with material running at NTSC video speed. The resulting frame rate is 23.976fps.

⇒ Speeding up or slowing down the video speed is only possible if the video is running through a “computer video card”. If a professional genlocked video card is used, the video playback speed is derived from the genlock input.

What is 23.976fps used for?

The world of digital video formats is ever changing and the results are new developments for every media professional involved in movies, television, corporate video, and more. With the advent of HD cameras that are capable of recording at several different frame rates internally, the options available to cinematographers have become staggering.

Because the look of film running at 24fps is unique, many HD productions are filmed at 24fps to mimic the look of film on video. Because the speed change from 24fps to 29.97fps NTSC is such an odd one (requiring the 0.1% pull-down), designers of these cameras have developed a method of recording that allows the camera to record like film but also output a NTSC video signal at the same time without any speed change. They record at 23.976fps which translates to 24fps pulled down -0.1%.

Working with video tape recorders

Whenever you are interfacing Nuendo with external hardware, some additional computer hardware may be necessary. In the case of using video tape recorders (VTRs) with Nuendo, a device capable of dealing with SMPTE timecode, word clock, video reference clock, MIDI machine control, and Sony 9-Pin machine control protocols will be needed.

The most important aspect of working with VTRs is the ability to maintain the best possible synchronization between Nuendo and the tape machine. Using a device such as Steinberg's SyncStation will provide the best results.

Regardless of your hardware setup, Nuendo will have to be configured to synchronize with the VTR. For further information on how to synchronize Nuendo with external equipment, see the chapter "[Synchronization](#)" on [page 496](#).

Tips

There are so many variables within the boundaries of a multi-media project that only years of experience can cope with all of them. However, here are a few tips and good ideas you can use to help eliminate some common issues.

Preproduction planning

The most important tip for making postproduction go smoothly for a TV commercial, feature film or even Internet media creation is good use of preproduction planning. Try and meet with all the people involved in a project prior to starting in order to decide how the work will flow once you get into postproduction. Determining frame rates for film and video, film transfer issues, what format the location audio will be recorded in, delivery formats and other details including a working copy of the script will be invaluable to any postproduction audio professional.

TC Burn-In

The timecode burn-in window (BITC) is a section of the video image that contains timecode numbers for each frame of video from the original video editor. Using this, it is possible to align a video perfectly in Nuendo so that all the timecode numbers line up exactly.



Timecode burn-in window in a video image

40

Audio editing to picture

Introduction

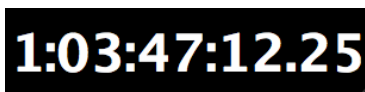
Nuendo has been designed from the ground up as a production tool with features that are catered to working with video and film. The depth and versatility of Nuendo's design allow you to work very precisely and yet retain the freedom and ease that allows greater creativity in creating music and sound design for film and video.

In this chapter, real world situations that you would encounter while working with video will be explained. These include the preparation of a video project, the addition of sound design elements, the conforming of audio material to picture changes, and the creation of tempo maps that are synchronized with video for use in scoring music to picture. Finally, the editing tools in Nuendo will be discussed as they relate to video postproduction techniques.

Video timeline and the grid

When working with video, every audio event and part is synchronized to the picture. Unlike music editing with an even grid of bars and beats to work with, video uses a much smaller increment of time as a basic grid: video frames. Since there are a finite number of video frames in each video, the frame becomes the basic measuring block for editing.

Video frames are numbered using SMPTE timecode. Depending on the frame rate of the video, there will be a certain amount of frames per second and then 60 seconds per minute, and 60 minutes per hour. SMPTE is displayed using colons to separate each division of time.



SMPTE timecode in the Time Display: showing 1 hour, 3 minutes, 47 seconds, 12 frames, and 25 subframes.

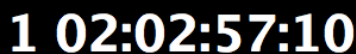
⚠ In the Project Setup dialog, make sure that the frame rate of the project matches that of the video. It is possible for Nuendo to detect the video frame rate for you, see the chapter [“Video”](#) on [page 520](#).

Film frames can be displayed as SMPTE numbers or in feet and frames (a traditional method used by film editors). Nuendo also offers a user-definable frame rate for specialized frame rates including Varicam HD video. For more information on all the frame rates and time displays available, see [“Frame rate \(speed\)”](#) on [page 498](#).

Subframes and days

Nuendo can also display the time between frames by using the subframe division which divides each frame into 80 subframes. Subframes appear separated from frames by a period. In order to see subframes displayed you must activate “Show Timecode Subframes” in the Preferences dialog (Transport page). If this is activated, subframes will be displayed wherever timecode is shown including the Transport panel, Project window, dialogs, Project Browser, Pool, and the SMPTE Generator plug-in.

In case a project crosses the 24 hour mark, Nuendo will automatically display a day number to the left of the SMPTE display separated by a space, no colon. It can be necessary to use days in timecode even when the project is shorter than 24 hours. For example, during live events that take place in the evening, if the central timecode generator for the event is running “time-of-day” SMPTE that correlates to the actual time on the clock, the time display may cross the 24h mark at midnight. In that case, all timecode values after midnight will have a “1” displayed in the days position.

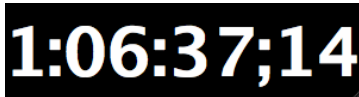


Time-of-day SMPTE that has crossed midnight or the 24 hour mark shows the day number “1” to the left of the SMPTE value. Note that subframes are not displayed in this image.

Drop-frame SMPTE

Drop-frame timecode is used for the 29.97fps frame rate used by the NTSC video standard and the 30fps frame rate. Since this frame rate does not correlate exactly to the actual time passing on the clock, a system has been devised that omits certain frame numbers in order to match the displayed time with the time of day. Nuendo distinguishes this frame count by separating the frame number with a semicolon instead of a colon. When you see time-

code displayed anywhere in Nuendo with a semicolon, you are using drop-frame timecode. This is the only indication besides looking at the Project Setup dialog, that you are using drop-frame timecode.



Drop-frame SMPTE timecode display with frames separated by a semicolon.

When the Project window's time display is set to timecode, the grid options change. The choices are:

- Subframe (1/100th of a frame)
- 1/4 frame (25 subframes)
- 1/2 frame (50 subframes)
- 1 frame
- 2 frames
- 1 second

These grid options allow editing, nudging and moving of events, fades and automation data in increments that relate to the video frames you can see.

Conforming production audio

Conforming audio to picture describes the process of editing and placing audio files in sync with the video. Once you have imported your video file or synchronized Nuendo with a VTR or other external video playback system, the next step is to get production audio imported and running in sync with the video. Production audio refers to any sound that was originally recorded during the filming or video taping process. This includes sounds and music added by the video editor in order to get an idea of the finished product.

Audio coming from a video editing session can come in a variety of formats. How to match the audio timecode values of these different formats to those used by the video editing suite will be described in the following sections.

Reference audio

Reference audio can be any audio that has been assembled and mixed in the video editing suite, usually as a guide for audio editors. It may be embedded in a video file, be a separate audio file or be recorded on tracks of a video tape recorder (VTR).

If the audio file is available in the Pool or the MediaBay, proceed as follows to conform it to the video file:

- Open the Media menu and select the "At Timecode Position..." option from the "Insert into Project" submenu. A window opens, where you need to enter the timecode value corresponding to the beginning of the video file. The reference audio file then lines up with the video file.
- Provided that the video file was inserted at the original timecode position and that the audio file contains origin timecode information, you can also use the "At Origin" command from the "Insert Into Project" submenu.

If you have already imported your audio file onto a track, proceed as follows to conform it to the video file:

- Activate the Snap On/Off button, open the Snap Type pop-up menu, and select "Events". When you now drag the audio event to the start of the video event, the two events are aligned automatically.

Once the reference audio file has been inserted into position, check the sync of audio to video throughout the length of the project. If there are any issues, it is best to fix them before you go on editing. Problems with timecode frame rates, sample rates and synchronization to external tape machines can wreak havoc on a production if they are discovered late in the process.

Multi-channel media

Multi-channel media can contain multiple tracks of audio edited by the video editing suite. Multi-channel media interchange formats help you get the audio from one workstation to another. This is useful, when the audio edited by the video editor is complex and has elements that you want to use in the final project. Nuendo is capable of handling OMF, AAF, OpenTL, and AES31 files for this type of exchange.

The most commonly used format, the OMF file, comes in two basic formats: files with embedded audio and files that refer to external audio media. Both formats store information about where to place each piece of audio in the timeline. Each format has its strengths and weaknesses and the choice of which one to use will depend on the circumstances, see “[File handling](#)” on [page 552](#).

After importing the OMF, align your video file to play in sync with the OMF audio. Here is where any reference audio embedded in the video file will come in handy. By listening to both the OMF audio and reference audio tracks, you will easily be able to tell if everything is in sync.

Since the OMF audio was created during the video edit, its timecode values should be correct. Adjusting the position of the video and reference audio to match the OMF audio would be the common method of aligning the two together. To ensure that the video event and reference audio events remain in sync with one another during editing, group them or move them into a folder track and move the folder track events.

⇒ When aligning reference audio from a video file to imported OMF audio, try panning the reference audio to one side and the OMF audio to the other. This makes it easier to discern whether one source is ahead of the other as they get closer to perfect sync. A comb filtering effect can be heard when two identical sources become very close in sync with one another.

Once the OMF audio is imported and all video and audio events are synchronized together, you are ready to begin adding new elements and creating the complete sound-track.

EDLs

EDLs (Edit Decision Lists) are lists of edits created by the video editing suite. These text files contain timecode and source tape information that can be used to align audio events to a reference video file in Nuendo. Each step describes a complete editing task including:

- The type of edit (audio, video or both).
- The source material (tape number, audio file name or video file name).
- The start and ending source timecode values.
- The start and ending destination timecode values.

The source material must have correct timestamps in order for the EDL timecode values to be valid. This can be achieved using timecode DAT machines, video tape machines, or field recorders, provided that the device is able to create audio files with embedded timestamps. The files can then be directly imported in Nuendo and placed in the project “at origin”. When using a video tape machine, Nuendo has to be synchronized to the machine in order to record audio into the project at the correct timecode positions, thereby giving the audio files the correct timestamps.

The information contained in the EDL can be used in Nuendo to place audio events in the Project window at the specific timecode positions that correspond to the edits made in the video editing suite. Depending on the length of the program material and the number of edits, this process can be time-consuming but also allows for the most precise control over the source material and synchronization.

Since original source tapes and recordings are used, the maximum quality of those recordings can be maintained.

To conform an EDL edit, proceed as follows:

- 1. Create a folder track for the source material.**

Having all your source material in one consolidated area will lessen confusion later in the process.

- 2. Create an audio track for each source tape.**

For DAT and video tape machines, having a separate track for each tape will prevent overlap of audio with the same timecode values and also keep things organized.

- 3. Name each track the same name as the source tape it comes from.**

Each audio file you record on that track gets the name of the source tape it came from.

- 4. Make sure that Nuendo is synchronized to the tape machine.**

This ensures that the audio file is placed at the correct timecode position in the Project window.

- 5. Record all the significant portions of each source tape into Nuendo.**

If only a portion of a source tape is used in the EDL, record that section into Nuendo.

6. Import any audio files from a field recorder, open the Media menu and from the “Insert into Project” submenu select “At Origin”.

Create as many tracks as necessary to prevent overlaps. Once the file has been placed “at Origin”, it can be used as a source for EDL conforming.

```
FCM: DROP FRAME
001 R1103  AA  C      00:21:29:19 00:21:35:21 01:00:00:00 01:00:06:02
* FROM CLIP NAME:  PRE SET A1
002 R0101  NONE C      00:00:44:06 00:00:49:08 01:00:06:02 01:00:11:04
* FROM CLIP NAME:  URBAN 1
AUD 3      4
003 R0207  AA  C      00:11:10:02 00:11:19:05 01:00:11:10 01:00:20:13
* FROM CLIP NAME:  OFFSTAGE B
```

An excerpt from a CMX EDL

7. Use the Range Selection tool to create a selection on the proper source track based on the two source time-code values.

This can be done via manual entry in the info line. In this example, enter 00:21:29:19 for the range start and 00:21:35:21 for the range end.

8. Open the Edit menu and select Copy.

The source material is copied into the clipboard.

9. Use the Range Selection pop-up menu to switch range selections.

Using the two different range selections (A and B) will keep the source and destination times separate (see also “[The Range Selection pop-up menu](#)” on [page 78](#)). This is similar to a four-point editing model used by many video and audio editors, see “[Four-point editing with the Range Selection tool](#)” on [page 540](#).

10. With the Range Selection tool, create a selection on a destination track using the two destination timecode values.

This can be done via manual entry in the info line. It is only necessary to define the destination in timecode since the paste function will automatically place an audio event of the correct size as determined by the source range.

⇒ The amount of destination tracks should be determined by the number used in the EDL. Some EDL formats only allow the use of 4 destination tracks. Your needs may vary according to the project itself. The main concern is getting the audio events in sync with the video. Once that is completed, placing audio events on various tracks is up to the user.

11. Open the Edit menu and select Paste.

This places the source material at the destination location. Check for sync with the video and reference audio.

12. Repeat as needed until the entire EDL is conformed.

Depending on the size of the EDL and number of edits, this process may take some time to be completed.

Once you have successfully imported video and reference audio and conformed any production audio to the video, you are ready to begin adding new sound elements and creating the final soundtrack.

Adding sound design elements

Sound design elements can come from a variety of sources including sound effect libraries on CD or hard drives, field recordings and even the production audio source tapes. In order to add these sounds to your project, they must be imported into the Pool or recorded into Nuendo from a tape machine.

⇒ Create various folders within the Pool to help organize all the sound files used in your Project. With feature length films, the amount of audio can be staggering. Finding specific audio files can become daunting quickly unless you properly organize your project. Nuendo’s MediaBay is designed to help you organize all your sound files so that they are instantly accessible to you and can be quickly searched.

Placing events to picture

Select one of the following methods to place your audio events to picture:

- Select the audio file in the Pool, open the context menu and select the “At Timecode Position” command from the “Insert into Project” sub-menu.

The audio event is inserted at the specified timecode position on the top-most selected track in the Project window. The right timecode number could come from an EDL or a cue list created earlier or from a locator position or marker.

- View the video using the shuttle and scrub tools, set the left locator at the position where you want to place the audio event and set the cursor to the left locator. Select the audio file in the Pool, open the Media menu and from the “Insert into Project” submenu select the “At Cursor” option.

- Activate the Edit Mode on the Transport menu, drag the audio events out of the Pool and place them on a track. Edit Mode will cause the video to follow the event as you move it in the Project window. Drag the event to the right video frame. You can use the Snap function to keep the audio event lined up with each timecode frame as you drag it into position.

- Use four-point editing with the Range Selection tool. This is described below.

Four-point editing with the Range Selection tool

It is often necessary to go through a large sound file to find a specific sound effect. This is especially true for field recordings with multiple takes of each sound and dead air time in between. In this situation, it might be best to set up an area in the project consisting of several “work” tracks that can be used to sort out various sound files and prepare them for use in the final soundtrack.

Using the Range Selection tool, a four-point editing model can be used to cut out ranges of the work tracks and paste them onto the proper tracks lined up with specific video frames. Proceed as follows:

1. Create a folder track and name it “Work Tracks”. This folder track will host several audio tracks that can be used as a scratch pad for editing sound effects and preparing them for use in the project.
2. Create several tracks to work on. You might need mono, stereo, and 5.1 audio tracks depending on the source material you are working with.



A folder track with four stereo work tracks can be used to edit various sound files before they are placed to picture.

3. Drag the various audio files onto these work tracks. Many sound effects libraries contain several versions of a particular sound effect. These can be auditioned and chosen directly on the work tracks. We recommend to place them at a time in the project that is after the end of the program material. This prevents your work tracks from getting inadvertently included in the final mix.

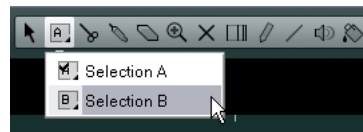
4. With the Range Selection tool, select the audio you want to use with the picture and press [Ctrl]/[Command]-[C] to copy it to the clipboard.

You can place several sound effects lined up together and select them all with the Range Selection tool for editing.



Selecting the desired sound effect with the range selection tool using selection A.

5. Use the Range Selection pop-up menu to switch range selections.



Switching the range to selection B.

6. Define the destination range for selection B. Using the key commands [E] (Left Selection Side to Cursor) and [D] (Right Selection Side to Cursor), you can define the range selection on the fly while watching the video.

7. Press [Ctrl]/[Command]-[V] to paste the clipboard data to the new location.

Note that you can set up a macro that combines the copy and paste processes. This can considerably speed up your work.

One very handy feature in using selections A and B is the ability to retain the view of each selection. If your work area is far away from the edit insertion point in the video (A is far away from B), zooming in closely to either location will leave the other outside the Project window viewing area. Changing selections between A and B will also cause the viewing area of the Project window to switch between the two locations instantly. This is really the key to this technique, allowing you to move quickly between source and destination audio while retaining two selections for editing.

Adjusting events to picture

Once audio events have been placed to picture, their fades, durations and positions can be fine-tuned.

Nuendo's nudge features are designed just for this type of use. As the nudge buttons are not displayed on the toolbar by default, you have to right-click on the toolbar and select "Nudge Palette" from the context menu to access them.



Using the nudge buttons you can incrementally adjust the position (move) and size (trim) of your events. Depending on Arrow tool mode, the nudge buttons will trim the events by moving the boundaries (Normal Sizing) or moving the contents inside the event (Sizing moves contents).

The size of the nudge increment is determined by the grid settings in the Project window. A typical nudge setting for picture editing would be 1 frame. However, even though the video's resolution might be no more than one frame, half-frame or even quarter-frame amounts could be necessary to accurately time events to picture.

Edit Mode is extremely helpful for fine-tuning event placement to picture. Since the video follows each edit you make with the mouse, you can instantly see where in the video your edit is taking place, whether that be the start position of an event, snap point or fade duration. This makes editing to picture fluid and more creative.

The Range Selection tool offers additional methods of editing including Cut Head, Cut Tail, Crop and Adjust Fades to Range. In Edit Mode, creating and adjusting the range will chase video so defining a range can be done visually to picture.

Conforming to picture changes

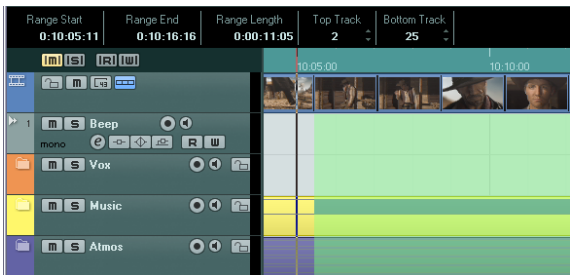
During the postproduction process, it is often necessary to make changes to the overall timeline of a project. When any change is made to the video, i.e. when video is cut or inserted, those changes must be reflected in the audio as well.

This can be achieved with the Range Selection tool. The key is to retain the relative positions of every event in the project after the edit is performed. For example, if a portion of video is removed, removal of events on all tracks including markers, MIDI, automation, and tempo tracks is necessary for everything to remain in sync after the edit point.

Picture cut

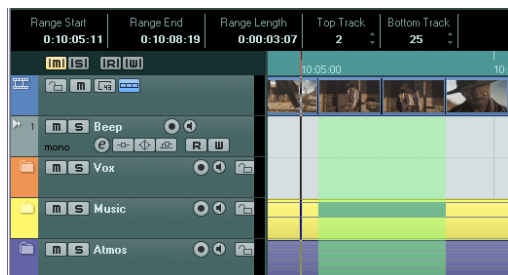
To make a picture change involving the removal of existing video, proceed as follows:

1. Determine the starting point and duration of the section to be removed.
This information should come from the video editor in the form of timecode values specifying the start point and duration of each cut. When several changes are made to a video, information about those changes comes in the form of a "change list". Reference video and audio can also be used to figure this out and also double check the edit once it is complete.
2. Select the Range Selection tool and on the Edit menu—Select submenu, choose "Select All".
This automatically selects all different types of tracks in your project including MIDI, Marker, Tempo, and Video.
3. Deselect the video track with the new edited version and lock this and any other reference track.
This prevents accidental editing.
4. In the Range Start field in the info line, enter the starting frame of the video change edit.
This is the first video frame to be removed. You can also locate the cursor to the starting frame and press [E] ("Left Selection Side to Cursor"). Make sure that Snap is active, Snap Type is set to "Grid" and Grid Type is set to "1 frame".



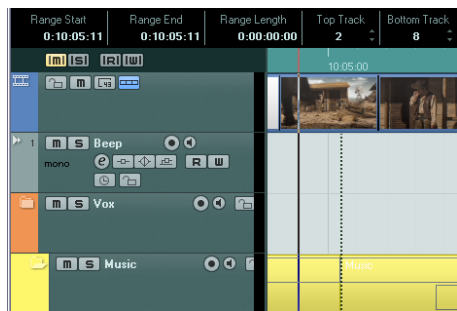
5. In the Range Length field in the info line, enter the duration of the cut.

Now the range selection encompasses all the events in the project that are to be removed together with the old video.



The range has been defined for the cut on all tracks.

6. On the Edit menu–Range submenu, select “Cut Time”. This will remove the selected area and move all the following events to the left by the same amount, filling the gap. The audio should now play in sync with the new video from the edit point on to the end.



The edit is complete. All events to the right have been moved to fill the gap.

Once the edit is complete, import the new video file and check the sync of audio to video through the edit point. Reference audio from the new video can be useful for checking your edits.

- ⚠ Once the new video and reference audio have been placed in the Project window, you may lock those tracks to prevent inadvertent editing later.

Picture insert

To make a picture change involving the addition of video material, proceed as follows:

1. Locate the insertion point where the video has been added.

This information comes from the video editor's change notes.

2. Select the Range Selection tool and on the Edit menu–Select submenu, choose “Select All”.

This automatically selects all tracks in your project.

3. In the Range Start field in the info line, enter the starting frame of the insertion.

You can also locate the cursor to the starting frame and press [E] (“Left Selection Side to Cursor”).

4. In the Range Length field in the info line, enter the duration of the inserted video.

This creates a selection of the same size as the inserted video.

5. On the Edit menu–Range submenu select “Insert Silence”.

Blank space is inserted and all events will be moved to the right to make room.

Synchronize tempo maps to picture

You can use the Time Warp feature in Nuendo to create tempo maps that are synchronized with video for use in scoring music to picture. When scoring music to picture, tempo changes in the music often need to follow specific visual elements on screen. Using the Time Warp feature with Edit Mode allows you to make these changes easily while viewing video.

For further information, see [“Matching a musical score to video”](#) on [page 461](#).

Using standard Nuendo tools for postproduction purposes

In this section the Nuendo editing tools related to video postproduction techniques are described.

Inserting audio into the project

The options listed below can be used with video to place audio events precisely at the video frame you choose.

Select your audio events in the Pool and use the “Insert into Project” options from the Media menu to place them in the Project window.

These options are described in detail in the section “[Inserting clips into a project](#)” on [page 325](#).

Using the Marker window as a spotting list

In the following section we will describe how to add markers and use the Marker window to position your audio events.

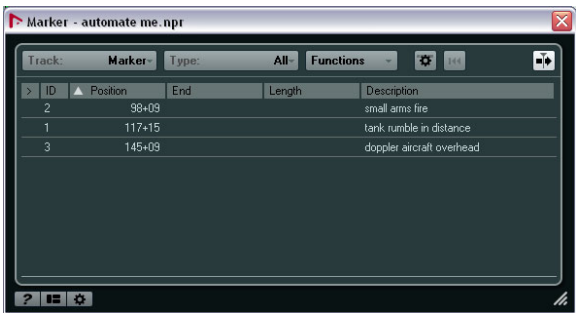
A spotting list is created by viewing a film or video and determining where certain sound effects and other audio elements will go during postproduction. The list consists of timecode values and descriptions of the sounds that will go there. For example:

Timecode	Description
01:07:36:15	Footsteps on concrete
01:07:53:02	Telephone rings
01:08:06:07	Explosion outside

In this list, there are three timecode locations and various sounds that are needed at those points in the video. During editing, sound effects could simply be placed using these timecode values and be relatively close to final position without much effort. To make it even faster, use the Marker window as a spotting list.

As you view a video in Nuendo, have the Marker window open, and as you “spot” places where sound effects need to be inserted, add a marker. With the Marker window open, you will see the newly created marker in the list. Once you complete the description and enter it, you can create another marker instantly, making it possible to create an entire spotting list on-the-fly in Nuendo.

After importing sound effects from a library or field recordings, they can be placed in the project using the Insert at Cursor option, moving the cursor to each marker by double-clicking in the very left column of the Marker window next to the desired number.



The Marker window used as a built-in spotting list

While the positioning of the audio events in this case might not be exact, it will quickly get audio in close proximity to the needed position. Fine tuning can be done later with other editing tools and features.

For further information, please refer to the chapter “[Using markers](#)” on [page 136](#).

Event handles

The event handles (fade in, fade out, and volume) are extremely useful for working with picture since their functions are tied to the event itself. When the event moves, so do the fades and volume level.

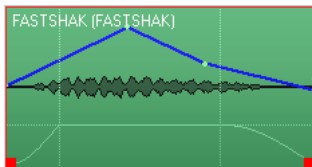
Since the event fades and volume are handled in real time, you can hear the results of your edits instantly. As long as you let go of the event handle before the cursor reaches the event during playback, you hear the result of your edit. Being able to edit while playback continues gives you more time and freedom to work while others are still listening to the playback.

For further information, please refer to the chapter “[Fades, crossfades and envelopes](#)” on [page 112](#).

Event envelopes

For even more control, the event envelope provides another type of volume control over the audio event. Instead of controlling only fade ins and outs or the overall volume of the event, envelopes can alter the volume of audio anywhere within the event.

To access the event envelope, select the Pencil tool and simply click within any audio event. A volume envelope line appears with a new curve point. Unity gain (no change) is where the envelope line is at the very top of the event. Any curve points below indicate gain reduction at that point. The waveform display reflects the change in volume for visual feedback as you edit. You can add as many curve points as you like by clicking again with the Pencil tool, giving you the ability to contour the volume of the event very precisely. To remove a curve point, drag it with the Pencil tool outside the event.



An event envelope with several curve points. Notice that the volume curve with fades and the overall volume is still displayed. The combination of the envelope and volume curve will determine the final audio level for each event.

⚠ One advantage to both the event handles (volume curve) and the event envelope is that their effects occur prior to the audio signal entering the mix engine of Nuendo. For example, if you have a compressor plug-in on a track in Nuendo and you increase the volume of an event on that track by using the volume handle, the compressor plug-in will see a greater input signal, altering its gain reduction accordingly. This can be very advantageous, e.g. when evening out levels in dialog tracks.

For further information, please refer to the chapter “Fades, crossfades and envelopes” on [page 112](#).

Range selection

Using the Range selection tool to edit audio to picture opens up many other possibilities and functionality. When you make selections with the Range selection tool, the info line displays the start, end and length of the selection.

The length indication is a handy timecode calculator when the project timeline is viewed in timecode. The start and end track numbers are also shown, outlining the top and bottom of the selection. All the values in the info line are editable.

- Altering the start moves the selection without changing its length.
- Altering the end changes the length of the selection.
- Altering the length changes the end time to match the desired length.
- Altering the first track number will change the number of the topmost track in the selection.
- Altering the last track will change the number of the bottom track in the selection. All tracks in between these two will be included in the selection.

Range Start	Range End	Range Length	Top Track	Bottom Track
0:10:04:01	0:10:04:20	0:00:00:18	15	16

The info line while using the Range selection tool. Notice the top and bottom track numbers at the right of the display.

It is also possible to select non-contiguous tracks in a range selection by [Alt]/[Option]-clicking within the borders of the selection on the track you wish to add to the range. Only that track area will be added. This can be repeated to add other tracks to the range.



Non-contiguous range selection. The track placement of this data is retained in the clipboard.

There are also functions that let you alter the range selection using the cursor, event boundaries, left and right locators, and the start and end of the project. These functions are found in the Edit menu—Select submenu.

When these operations are assigned to key commands, the increase in speed and efficiency for creating range selections can be considerable. The various options of the Select submenu are described in detail in the section “Range editing” on [page 77](#).

By using these commands in various combinations, it is possible to create range selections quickly based on event boundaries, cursor and locator positions, and on-the-fly “capturing” during playback. These workflow improvements can become indispensable for many postproduction tasks.

For a description of the options on the Range submenu of the Edit menu, see “Editing selection ranges” on [page 78](#).

Range editing

Once you have a range selection defined, there are many editing operations that can be performed to the selection. Some of these range edits have been designed expressly for postproduction in order to streamline workflow and increase efficiency and creativity. Others include the standard editing functions cut, copy and paste along with mouse operations to move selected audio (see “Range editing” on [page 77](#)).

You can also use the “Cut Head” and “Cut Tail” functions on the Edit menu for the editing of ranges and events, see “Using Cut Head and Cut Tail” on [page 71](#). Furthermore you can use the “Adjust Fades to Range” command on the Audio menu, see “Creating and adjusting fades with the Range Selection tool” on [page 113](#).

⚠ Range editing can affect any type of event in the Project window including video, MIDI, markers, and automation data. When performing edits that affect the entire timeline (editing picture changes for instance) range edits can be very effective.

Edit Mode

When editing to video, it is always important to know how each edit relates to the exact frame of video where it occurs. Video playback follows the Nuendo transport, so that the video frame at the current project cursor position is shown, during playback and in Stop mode (e.g. if you

move the project cursor manually or use fast forward/rewind). However, if you perform event or range-based editing tasks you will get no visual feedback. The special Edit Mode solves this problem, allowing you to edit audio while getting continuous visual feedback on the video display:

- If you activate “Edit Mode” on the Transport menu, the project cursor will automatically follow when you make selections or perform editing operations (such as moving, resizing, adjusting fades, etc.).

Because the video automatically follows the project cursor, you will instantly get a visual feedback when you edit! This makes it very easy to move an audio event to a certain spot in the video, for example.

- To avoid obscuring the view, the project cursor is hidden from the event display in Stop mode if Edit Mode is activated.

However, it is always displayed in the ruler.

Listed below are some examples of how you can use Nuendo's Edit Mode for matching audio and MIDI to video.

Edit Mode: Arrow tool

When editing events with the Arrow tool, Edit Mode causes the video to follow your motions as you drag events and event handles. For instance, when you click and drag one or more events, the video will follow the left edge of the first event while you drag, giving you visual feedback on the position in the video. This is very helpful while placing sound effects to picture since you can see things in the video as you move sounds around in the Project window. Lining up sound effects to their visual counterparts becomes quite easy and quick.

Edit Mode follows the snap point of each audio event. If the snap point has not been modified, it remains at the start of the event. It can often be necessary to align a portion of audio in the middle of the event. Adjusting the snap point to a position in the audio event that is timing sensitive will allow you to use Edit Mode to visually line up that position to the video.

For example, the sound of a car skidding to a stop might be easily timed to picture by lining up the end of the skid sound with the stopping of the car in the video. The car might come into the frame after the skidding had begun, thereby making it very difficult to align the sound quickly without a starting point reference. The snap point over-

comes this problem by allowing you to reference another point in the audio event. By moving the snap point to the end of the skidding sound, Edit Mode can be used to line that point with the stopped car on screen.

When adjusting fade handles, the video will follow the position of the fade handle as you move it, allowing you to position fades exactly in time with the video.

Edit Mode: Range Selection tool

When making range selections, Edit Mode causes the video to follow the range as you make the selection.

If you have a video section and an audio event for it that does not quite fit, you can use time stretch to change the length of the audio:

1. Position the start of the audio event at the correct position according to the video.

2. In Edit Mode, select the Range Selection tool and double-click on the audio event.

This creates a selection range that spans the whole audio event.

3. Click the right edge of the selection range and drag to adjust it to the desired length.

While you are dragging, the project cursor position follows the right edge of the range, allowing you to pinpoint the desired end position in the video.

4. Use “Locators to Selection” (on the Transport menu) to set the locators to the selection range you just made.

5. With the Arrow tool, select the audio clip to be stretched.

6. On the Audio menu–Process submenu, select “Time Stretch”.

The Time Stretch dialog opens.

7. Click the “Use Locators” button.

The time stretch ratio is set up so that the audio event will fit the locator range.

⚠ Make sure that you do not exceed the 75% to 125% limit!

8. Make the desired settings and click Process.

The audio is stretched or compressed to fit the range.

If you want the audio to fade in, reaching full volume at a certain position in the video, and fade out at another position, here is a quick way of achieving this:

⚠ This assumes that the audio event is already positioned and sized correctly according to the video.

1. In Edit Mode, select the Range Selection tool.

2. Make a selection range in the audio event, roughly covering the section that you want to be played at full volume.

3. Click and drag the edges of the selection range so that they exactly correspond to the end of the fade-in and the start of the fade-out, respectively.

While you are dragging, the project cursor position follows the edge of the range, allowing you to pinpoint the desired fade-in and fade-out position in the video.

4. Pull down the Audio menu and select “Adjust Fades to Range”.

The fade-in and fade-out handles of the audio events are automatically adjusted.

⇒ When using the fade handles of an audio event in Edit Mode, the cursor will follow their position as well, allowing you to adjust fades to picture in this manner.

Edit Mode: Nudge commands

Nudging of events or range selections will also cause the video to move to the nudge position. All nudge commands (start, position, and end) will have this behavior in Edit Mode.

Text editing

For extremely precise editing, text entry may be used to perform most editing tasks in Nuendo. The info line in the Project window gives you instant access to any selected event's data including start and end points, duration, offset, snap point, fade-in, and fade-out durations. Additionally, the Project Browser allows text editing of each event in the project in a list view including automation data, video events, and markers.

Text editing can be useful when conforming audio to edit decision lists (EDLs) created by video editors. A list of audio files will be shown with source and destination timecode values that can be used to place audio events in Nuendo.

```
001 BL V C 00:00:00:00 00:31:06:10 00:59:57:00 01:31:03:10
002 4 A2 C 18:10:50:09 18:11:43:06 01:31:03:10 01:31:56:07
* POLICE STATION V SEES H PA (2)
* POLICE STATION V SEES H PO (2)
*>>MEDIAFILE POLICE STATION V SEES H PA (2)
* FROM CLIP NAME: POLICE STATION V SEES H PO (2)
* FROM SCENE: 66A TAKE 6
003 4 A C 20:02:58:11 20:03:04:17 01:31:03:10 01:31:09:16
* MOTEL V - H POV TA (4)
* MOTEL V - H POV TAKE 2
*>>MEDIAFILE MOTEL V - H POV TA (4)
* FROM CLIP NAME: MOTEL V - H POV TAKE 2
* FROM SCENE: 69F
004 4 A C 19:52:52:16 19:52:54:21 01:31:09:16 01:31:11:21
* MOTEL H STAND V POVA (2)
* MOTEL H STAND V POV (1)
*>>MEDIAFILE MOTEL H STAND V POVA (2)
* FROM CLIP NAME: MOTEL H STAND V POV (1)
* FROM SCENE: 69E
```

An EDL with source and destination timecode values.

For further information, please refer to the chapter [“Using markers”](#) on [page 136](#).

41

ReWire

Introduction

ReWire and ReWire2 are special protocols for streaming audio between two computer applications. Developed by Propellerhead Software and Steinberg, ReWire provides the following possibilities and features:

- Realtime streaming of up to 64 separate audio channels (256 with ReWire2), at full bandwidth, from the “synthesizer application” into the “mixer application”. In this case, the “mixer application” is of course Nuendo. An example of a “synthesizer application” is Propellerhead Software’s Reason.
- Automatic, sample accurate synchronization between the audio in the two programs.
- The possibility to have the two programs share one audio card and take advantage of multiple outputs on that card.
- Linked transport controls that allow you to play, rewind, etc., either from Nuendo or from the synthesizer application (provided it has some kind of transport functionality).
- Automatic audio mixing functions of separate channels as required.

In the case of Reason, for example, this allows you to have separate mixer channels for the different devices.

- Additionally, ReWire2 offers the possibility to route MIDI tracks in Nuendo to the other application, for full MIDI control.

For each ReWire2 compatible device, a number of extra MIDI outputs will be made available in Nuendo. In the case of Reason, this allows you to route different MIDI tracks in Nuendo to different devices in Reason, with Nuendo serving as the main MIDI sequencer.

- The overall load on your system is much reduced, compared to when using the programs together in the conventional way.

Launching and quitting

When using ReWire, the order in which you launch and quit the two programs is very important:

Launching for normal use with ReWire

1. First launch Nuendo.
2. Enable one or several ReWire channels in the ReWire Device dialog for the other application.

This is described in detail in the section [“Activating ReWire channels”](#) on [page 550](#).

3. Launch the other application.

It may take slightly longer for the application to start when you are using ReWire.

Quitting a ReWire session

When you are finished, you also need to quit the applications in a special order:

1. First quit the synthesizer application.
2. Then quit Nuendo.

Launching both programs without using ReWire

We cannot think of any scenario, in which you would need to run Nuendo and the synthesizer application simultaneously on the same computer, without using ReWire, but you can:

1. First launch the synthesizer application.
2. Then launch Nuendo.

⇒ Please note that the two programs now compete for system resources such as audio cards, just as when running either with other, non-ReWire audio applications.

Activating ReWire channels

ReWire supports streaming of up to 64 separate audio channels, while ReWire2 supports 256 channels. The exact number of available ReWire channels depends on the synthesizer application. Using the ReWire Device panels in Nuendo, you can specify which of the available channels you want to use:

1. Pull down the Devices menu and select the menu item with the name of the ReWire application. All recognized ReWire compatible applications will be available on the menu.

The ReWire panel appears. This consists of a number of rows, one for each available ReWire channel.

2. Click on the power buttons to the left to activate/deactivate the desired channels.

The buttons light up to indicate activated channels. Please note that the more ReWire channels you activate, the more processing power is required.

- For information about exactly what signal is carried on each channel, see the documentation of the synthesizer application.

3. If desired, double-click on the labels in the right column, and type in another name.

These labels will be used in the Nuendo Mixer to identify the ReWire channels.

Using the transport and tempo controls

- ⚠ This is only relevant if the synthesizer application has some sort of built-in sequencer or similar.

Basic transport controls

When you run ReWire, the transports in the two programs are completely linked. It does not matter in which program you play, stop, fast forward or rewind. However, recording (if applicable) is still completely separate in the two applications.

Loop settings

If there is a loop or cycle facility in the synthesizer application, that loop will be completely linked to the cycle in Nuendo. This means that you can move the start and end point for the loop or turn the loop on or off in either program, and this will be reflected in the other.

Tempo settings

As far as tempo goes, Nuendo is always the master. This means that both programs will run in the tempo set in Nuendo.

However, if you are not using the tempo track in Nuendo, you can adjust the tempo in either program, and this will immediately be reflected in the other.

- ⚠ If you are using the tempo track in Nuendo (i.e. the Tempo button is activated on the Transport panel), you should not adjust the tempo in the synthesizer application, since a tempo request from ReWire will automatically deactivate the tempo track in Nuendo!

How the ReWire channels are handled in Nuendo

When you activate ReWire channels in the ReWire Device panels, they will become available as channel strips in the Mixer. The ReWire channel strips have the following properties:

- ReWire channels appear to the right of the other audio and MIDI channel strips in the Mixer.
- ReWire channels may be any combination of mono and stereo, depending on the synthesizer application.
- ReWire channels have the same functionality as regular audio channels.

This means you can set volume and pan, add EQ, insert effects and sends and route the channel outputs to groups or busses (done in the Inspector). However, ReWire channels have no monitor buttons.

- All ReWire channel settings can be automated using the Read/Write buttons.

When you write automation, channel automation tracks will automatically appear in the Project window. This allows you to view and edit the automation graphically, just as with VST instrument channels, etc.

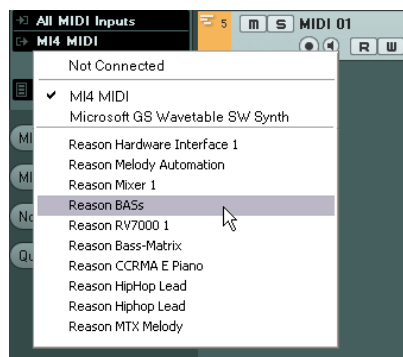
- You can mix down the audio from ReWire channels to a file on your hard disk with the Export Audio Mixdown function (see [“Mixing down to audio files”](#) on [page 474](#)).

You can export the output bus to which you have routed the ReWire channels. You can also export individual ReWire channels directly – “rendering” each ReWire channel to a separate audio file.

Routing MIDI via ReWire2

⚠ This feature is only available with ReWire2-compatible applications.

When using Nuendo with a ReWire2-compatible application, additional MIDI outputs will automatically appear on the MIDI Output pop-up menus for MIDI tracks. This allows you to play the synthesizer application via MIDI from Nuendo, using it as one or several separate MIDI sound sources.



The MIDI outputs for a Reason song. Here, each output goes directly to a device in the Reason rack.

- The number and configuration of MIDI outputs depends on the synthesizer application.

Considerations and limitations

Sample rates

Synthesizer applications may be limited to audio playback in certain sample rates. If Nuendo is set to a sample rate other than those, the synthesizer application will play back at the wrong pitch. Consult the documentation of the synthesizer application for details.

ASIO drivers

ReWire works well with ASIO drivers. By using the Nuendo bus system you can route sounds from the synthesizer application to various outputs on an ASIO compatible audio card.

Importing audio

In Nuendo audio can be imported in a variety of different formats. For example, you can import tracks from audio CDs, or import audio files saved in different formats (compressed and uncompressed).

For information on audio file import preferences, see “Audio file import options” on page 64. For information on how to import audio files into the Pool and import options, see “About the Import Medium dialog” on page 329.

Importing audio CD tracks

You can import audio from audio CDs into Nuendo projects in two ways:

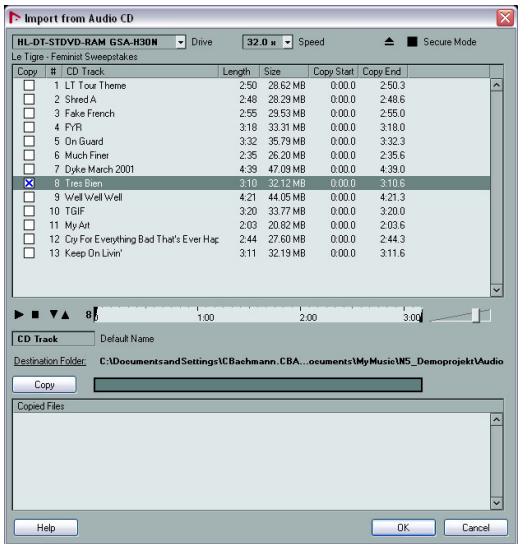
- To import the CD tracks directly into project tracks, choose the “Audio CD...” option from the Import sub-menu of the File menu.

The imported audio CD track(s) are inserted on the selected audio track(s) at the project cursor position.

- To import the CD tracks into the Pool, select “Import Audio CD...” from the Media menu.

This might be the preferred method if you want to import several CD tracks in one go.

Selecting one of the Import Audio CD menu items brings up the following dialog:



To import one or more tracks, proceed as follows:

1. If you have more than one CD drive, select the correct one from the Drives pop-up menu at the top left.

On opening the CD, the program tries to retrieve the track names from CDDb (a CD database). If no connection to CDDb can be established or the CD track names are not found, you can manually change the generic track name in the Default Name field.

2. Windows only: Activate the “Secure Mode” option if you want to use a Secure Read mode.

Use this if you encounter problems when trying to import an audio CD. Error checking and correction will be done during the process. Note that this mode will take more time.

3. In the Windows version, select the data transfer speed from the Speed pop-up menu.

While you normally want to use the fastest possible speed, you may have to select a slower speed for flawless audio extraction.

4. Activate the Copy checkbox for every audio file you want to import.

You can also select a copy section for every file, see below.

5. Click on the Copy button to create a local copy of the audio file(s) or section(s).

The copied files are listed at the bottom of the dialog. By default, imported audio CD tracks will be stored as Wave files (Windows) or AIFF files (Mac) in the Audio folder of the current project. To change the folder, click Destination Folder and select a different folder from the dialog. During copying, the Copy button is labeled “Stop”; click it to stop the process.

6. Click OK to import the copied audio files into the project, or click Cancel to stop the import and discard the copied files.

- If you import more than one audio file into project tracks, a dialog opens in which you have to choose whether to insert the tracks on one track or on different ones.

The new track(s) are displayed in the Project window. New audio clips are created and added to the Pool.

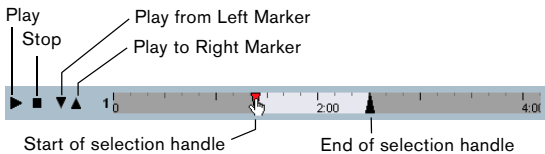
The columns in the “Import from Audio CD” dialog have the following functionality:

Column	Description
Copy	Activate the checkbox in this column for the track you want to copy/import. To activate more than one checkbox, click and drag over the checkboxes (or press [Ctrl]/[Command] or [Shift] and click).
#	This is the track number.

Column	Description
CD Track as shown	When you import an audio CD track, the file is named according to this column. The names are pulled automatically from CDDb, if possible. You can rename a track by clicking in the CD Track column and typing a new name. You can also apply a generic name to all audio CD tracks, if no name was available in CDDb.
Length	The length of the audio CD track in minutes and seconds.
Size	The file size of the audio CD track in MB.
Copy Start	You can copy a section of a track if you like. This indicates the start of the section to be copied in the track. By default, this is set to the start of the track (0.000) but you can adjust this on the copy selection ruler (see below).
Copy End	Indicates the end of the section to be copied in the track. By default, this is set to the end of the track but you can adjust this on the copy selection ruler (see below).

By default, complete tracks are selected.

- If you want to copy and import a section of an audio CD track only, select the track in the list and specify the start and end of the selection to be copied by dragging the handles in the copy selection ruler.



⇒ Note that you can import sections of several audio CD tracks by selecting them in turn and adjusting the selection. The start and end settings for each track are displayed in the list.

- You can audition the selected audio CD track by clicking the Play button.

The track will be played back from selection start to selection end (or until you click the Stop button).

- The Play from left Marker (down arrow) and Play to Right Marker (up arrow) buttons allow you to audition the start and end of the selection only.

The down arrow button will play a short snippet beginning at the start of the selection, while the up arrow button will play a snippet starting just before the end of the selection.

- To open the CD drive, click on the Eject button at the top of the dialog.

Importing Audio from video files

While you can automatically extract the audio when importing a video file (see [“About thumbnail cache files”](#) on [page 524](#)), it is also possible to import the audio from a video file without importing the video itself:

1. Pull down the File menu, open the Import submenu and select “Audio from Video File...”.
2. In the file dialog that opens, locate and select the video file and click Open.
The audio in the selected video file is extracted and converted to a Wave file in the project’s Audio folder.

- A new audio clip is created and added to the Pool. In the Project window, an event referencing the audio file is inserted on the selected track at the project cursor position. If no track was selected, a new track is created. This works just like importing regular audio files.

⇒ For importing video files, see [“Importing video files”](#) on [page 523](#).

Importing ReCycle files

ReCycle by Propellerhead Software is a program designed especially for working with sampled loops. By “slicing” a loop and making separate samples of each beat, ReCycle makes it possible to match the tempo of a loop and edit the loop as if it was built of individual sounds. Nuendo can import two file types created by ReCycle:

- REX files (export file format of the first versions of ReCycle, extension “.rex”).
- REX 2 files (file format of ReCycle 2.0 and later, extension “.rx2”).

⚠ For this to work, the REX Shared Library needs to be installed on your system. If this is not the case, you will find the corresponding installer on the installation DVD (in the “Additional Content\Installer Data” folder).

Proceed as follows:

1. Select an audio track and move the project cursor to where you want the imported file to start.
You probably want to import REX files to tempo based audio tracks, since this will allow you to change the tempo later on (having the imported REX file automatically adjust).
2. Select “Audio File...” from the Import submenu of the File menu.

3. On the file type pop-up menu in the file dialog, select REX File or REX 2 File.

4. Locate and select the file you want to import, and click Open.

The file is imported and automatically adjusted to the current Nuendo tempo.

Unlike a regular audio file, the imported REX file will consist of several events, one for each “slice” in the loop. The events will automatically be placed in an audio part on the selected track and positioned so that the original internal timing of the loop is preserved.

5. If you now open the part in the Audio Part Editor, you can edit each slice separately by muting, moving and re-sizing events, adding effects and processing, etc. You can also adjust the tempo and have the REX file automatically follow (provided that its track is tempo based).

⇒ You can achieve similar results by using Nuendo's own loop slicing features, see [“Working with hitpoints and slices”](#) on [page 299](#).

Importing compressed audio files

Nuendo can import (and export, see [“Mixing down to audio files”](#) on [page 474](#)) several common audio compression formats. The procedure is the same as when importing any non-compressed audio file, with one important thing to note:

- When you import a compressed audio file, Nuendo creates a copy of the file and converts this to Wave format (Windows) or AIFF format (Mac OS X) before importing it. The original compressed file will not be used in the project. The imported file is placed in the designated project Audio folder.

⚠ The resulting Wave/AIFF file will be several times larger than the original compressed file.

The following file types are supported:

MPEG audio files

MPEG, which stands for Moving Picture Experts Group, is the name of a family of standards used for encoding audio-visual information (e.g. movies, video, music) in a digital compressed format.

Nuendo can read two types of audio MPEG files: MPEG Layer 2 (*.mp2) and MPEG Layer 3 (*.mp3). Currently, mp3 is the most common of these formats, while the mp2 format is mostly used in broadcast applications.

Ogg Vorbis files

Ogg Vorbis is an open and patent-free format that offers very small audio files maintaining comparatively high audio quality. Ogg Vorbis files have the extension “.ogg”.

Windows Media Audio files (Windows only)

Windows Media Audio is an audio format developed by Microsoft, Inc. Due to advanced audio compression algorithms, Windows Media Audio files can be made very small, maintaining good audio quality. The files have the extension “.wma”.

⇒ For exporting Audio, see the chapter [“Export Audio Mixdown”](#) on [page 473](#).

Exporting and importing OMF files

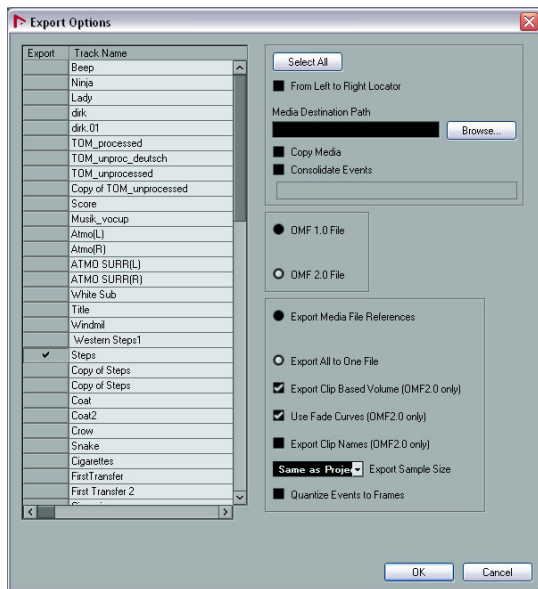
Open Media Framework Interchange (OMFI) is a platform independent file format intended for the transfer of digital media between different applications. Nuendo can import and export OMF files (file extension “.omf”), allowing you to use Nuendo in conjunction with other audio and video applications.

Exporting OMF files

When exporting tracks and files as OMF, you should consider setting up your project to use mono tracks and mono files, to allow compatibility with audio applications that provide limited support for interleaved audio files. See [“Converting audio tracks \(multi-channel to mono and vice versa\)”](#) on page 563 for more information.

1. Pull down the File menu, open the Export submenu and select “OMF...”.

The Export Options dialog opens.



The Export Options dialog for OMF files

2. Use the track list to the left to select the tracks that you want to include in the exported file.

To select all tracks, click the “Select All” button. Normally, the whole project is included – to export the range between the locators only, activate “From Left to Right Locator”.

- When referencing media files (see below), you can set the referenced output path by entering it in the “Media Destination Path” field or by clicking on “Browse...” and choosing it in the file dialog that opens.

All file references will be set to this path. You can create references to media destinations that do not exist on the system you are currently working with, making it easy to prepare files for use in projects on another system or in a network environment.

3. If you want to create copies of all the media files, choose the “Copy Media” option.

By default, the copied audio files are placed in a subdirectory in the export destination folder. To specify a different location for the copied files, use the “Media Destination Path” field.

4. If you want to copy only the portions of audio files that are used in the project, activate “Consolidate Events”. You can also define handle lengths in milliseconds to include audio outside each event boundary for later fine tuning. If you do not have any handles when consolidating audio files, you will not be able to adjust fades or edit points when the project is imported in another application.

5. Select “1.0 File” or “2.0 File”, depending on which OMF version is supported by the application in which you plan to import the file.

- Select whether you want to include all audio data in the OMF file (“Export All to One File”) or use references only (“Export Media File References”).

If you choose “Export All to One File”, the OMF file will be totally “self-contained”, but possibly very large. If you choose “Export Media File References”, the file will be small, but the referenced audio files must be available for the receiving application.

6. If you selected the “2.0 File” option above, you can choose whether to include the volume settings and fades for the events (as set up with the event volume and fade handles) as well as the clip names – to include these in the OMF file, activate “Export Clip Based Volume”, “Use Fade Curves” and/or “Export Clip Names”.

7. Specify a sample size (resolution) for the exported files (or use the current project settings).

8. If you activate “Quantize Events to Frames”, the event positions in the exported file will be moved to exact frames.

9. Click OK, and specify a name and location in the file dialog that opens.

The exported OMF file will contain (or reference) all audio files that are played in the project (including fade and edit files). It will not include unused audio files referenced in the Pool, or any MIDI data. Video files are not included.

Importing OMF files

1. Pull down the File menu, open the Import submenu and select “OMF...”.
2. In the file dialog that opens, locate the OMF file and click Open.
 - If there is already an open project, a dialog opens in which you can select whether a new project is created for the file.
If you select “No”, the OMF file will be imported into the current project.
3. If you choose to create a new project, a file dialog opens in which you can select the project folder.
Select an existing project folder or create a new one.

4. The Import Options dialog opens, allowing you to choose a track for the import.

- Activating the “Import all media files” option allows you to import media that is not referenced by events.
- Activating the “Import Clip Gain as Automation” option imports volume automation and envelopes of the Volume Automation Track of each track.

- “Import at Timecode Position” will insert the elements contained in the OMF file at their original timecode positions.

This is useful when you want to position every imported element at its exact timecode position, i.e. as it was saved in the OMF file. This way, the elements will end up at their correct time positions even when Nuendo uses a different frame rate than the OMF file. This is usually required in a picture-related context.

- “Import at Absolute Time” will insert the elements contained in the OMF file starting at the timecode position saved in the file and keeping the relative distances between the elements.

This is required when the relative positioning of the elements inside the OMF file needs to be maintained after importing it into the Nuendo timeline (even if Nuendo is set to a different frame rate than the OMF file). This is usually required in music contexts, where the timing between objects has highest priority.

- If the OMF file contains video event information, you are asked whether you want to create Markers at the start position of the video events.

This allows you to manually import the video files, using the Markers as position references.

A new, untitled project is created (or tracks are added to the existing project), containing the audio events of the imported OMF file.

Exporting and importing AAF files

The Advanced Authoring Format (AAF) is a multimedia file format used to exchange digital media and meta data between different systems and applications across multiple platforms. Designed by the top media software companies, this format will help media creators by allowing them to exchange projects between applications without losing valuable meta data such as fades, automation and processing information.

Exporting AAF files

1. Select “AAF...” from the Export submenu of the File menu.
2. You can choose which tracks will be exported from your project by clicking in the export column for each track name in the list.
A checkmark will appear next to each track that will be exported. You may also click the “Select All” button to select every track in the project for export.
3. If you wish to only export the portion of project that is between the left and right locators, activate the “From Left to Right Locator” checkbox.
If an event crosses over the left or right locator, it will be trimmed in the AAF file to the point of the locator. Only the portions of events that lie within the boundaries of the locators will be included in the exported file.
4. If you want to create copies of all the media files, choose the “Copy Media” option.
By default, the copied audio files are placed in a subdirectory in the export destination folder. To specify a different location for the copied files, use the Media Destination Path field.

5. If you want to copy only the portions of audio files that are used in the project, activate “Consolidate Events”.
You can also define handle lengths in milliseconds to include audio outside each event boundary for later fine tuning. If you do not have any handles when consolidating audio files, you will not be able to adjust fades or edit points when the project is imported in another application.

⇒ Even when selecting neither of the above two options, you can still enter a media destination path. All file references will be set to this path. You can create references to media destinations that do not exist on the system you are currently working with, making it easy to prepare files for use in projects on another system or in a network environment.

6. In the Options section, you have the choice of exporting all data to one file or to create media references to files from within the AAF file.

Exporting only one file makes transfers simpler, but, at the time of writing of this manual, certain applications cannot handle single AAF files. Check with each software manufacturer for up-to-date information regarding AAF support in other applications.

7. You can specify the Sample Size by using the pop-up menu.

This defaults to keeping the same setting as the project.

8. You can quantize events to frame boundaries by activating the “Quantize Events for Frames” option.

Quantizing events to frame boundaries is sometimes necessary when exporting projects to video workstations that limit the accuracy of edits to the frame. Any events that begin or end not on a frame boundary can exhibit odd behavior or be moved when imported into a workstation of this type.

Importing AAF files

1. Select “AAF...” from the Import submenu of the File menu.

2. Once you have selected a valid AAF file, Nuendo will ask you if you wish to create a new project. Choosing Yes will import tracks into a new project.

3. Select a directory or create one for the new project. If you choose not to create a new project, the imported tracks will be added to the currently active project.

4. In the dialog that opens, select the tracks you wish to import by clicking in the Import column next to each track. You can also click the Select All button to import all tracks in the AAF file.

5. Click OK.

The import process will begin. Depending on the size of the imported project and if the files are embedded or referenced, the import process may take a while.

Exporting and importing AES31 files

The AES31 standard is an open file interchange format, developed by the Audio Engineering Society as a means of overcoming format incompatibility issues between different audio hardware and software. It can be used for transferring projects via disk or network from one workstation to another, retaining time positions of events, fades, etc.

AES31 uses the widely used Microsoft FAT32 file system with Broadcast Wave as the default audio file format. This means that an AES31 file can be transferred to and used with any digital audio workstation that supports AES31, regardless of the type of hardware and software used, as long as the workstation can read the FAT32 file system and Broadcast Wave files (or regular Wave files).

Exporting AES31 files

1. Select “AES31...” from the Export submenu of the File menu.

2. Specify a name and location for the file and click Save. The exported file will contain all Audio Track data, including audio file references. If any of the audio events in your project has realtime fades (as set up with the fade handles for the events), these will automatically be converted to fade audio files and stored in a fades folder next to the AES31 file.

The following will not be included in the resulting AES file:

- Any Mixer settings or automation made in Nuendo.
- MIDI Tracks.

The saved file will be an XML file (but with the extension “.adl”, for audio decision list) – this means you can open it in any text editor to check file references, etc.

Importing AES31 files

1. Select “AES31...” from the Import submenu of the File menu.

2. Navigate to the location of the AES31 file (extension “.adl”), select it and click Open.

You are prompted to select or create a project folder for the new project.

3. After specifying the name and location of the project folder, the new project opens containing all the audio tracks and events stored in the AES31 file.

Exporting and importing OpenTL files

OpenTL is a file exchange format originally developed for Tascam hard disk recording systems. OpenTL facilities also exist in a variety of DAWs, making Nuendo project transfer reliable and solid. For example, a common use of OpenTL is to convert hassle free between Nuendo and Pro Tools. If you import or export an OpenTL file to/from Nuendo, the resulting project will contain all audio files, edits, and track names made in the Tascam device or DAW, with all events positioned sample accurately on the time line.

OpenTL implementation in Tascam® MMR-8, MMP-16 and MX-2424

All three Tascam devices work with either two types of disk volume formats: FAT32 (Windows standard) or HFS+ (Mac OS standard). For proper Nuendo compatibility it is necessary that each and every MMR-8/MMP-16 be running OS v5.03 and MX-2424 v3.12. A number of crucial OpenTL updates only appear in these machine operating systems, and only this setup can assure reliable Nuendo exchange.

Audio file formats are volume type dependent: for FAT32 this is BWF (*.wav) and for HFS+ this is SDII. OpenTL files can only be transferred within file systems of the same format which means that it is not possible to import an OpenTL project exported from Mac (HFS+) into a Windows system (FAT32) or vice versa, unless you use a conversion utility (e.g. MM-EDL).

Nuendo for Windows supports OpenTL FAT32/BWF. Nuendo for Mac OS X supports OpenTL HFS+/SDII as well as FAT32/BWF. MMR-8, MMP-16, and MX-2424 support OpenTL projects sourcing or targeting Nuendo PC with up to 999 mono tracks.

Exporting OpenTL files

First, make sure all audio files (in the Pool) and tracks (in the Project window) in the project are in mono (split stereo tracks and stereo interleaved audio files to dual mono) and all 16-bit or all 24-bit. The OpenTL specification does

not include support for 32-bit audio files. If the Pool contains 32-bit audio files, these will not be exported. Make sure all referenced audio files are located on the drive to which you want to export the OpenTL file.

⚠ When exporting OpenTL files on PC, do not change the DF or NDF frame notation after you have set the project start time. Make sure that all audio files in the Pool have the same sample rate, bit depth, and that all are set to Broadcast Wave file type.

1. Select "OpenTL..." from the Export submenu of the File menu.

In the dialog that opens, activate the "Copy Media" or the "Consolidate Events" option to guarantee that all audio is exported. Locate the target hotswap FAT32 disk, select the appropriate project folder and click Open.

2. Select a name and location for the new file and click Save.

The exported file will contain all audio track data, including file references, clip based volume automation, fade-in, fade-out, and crossfades.

3. Now you can mount the carrier in the Tascam device and load the project.

The following will not be included in the resulting OpenTL EDL file:

- Any realtime mixing, EQ, effects settings, breakpoint automation tracks
- MIDI tracks made in Nuendo

The following is a basic OpenTL specification description:

- Maximum number of mono tracks: 999
- Supported sample rates (Hz): 44056, 44100, 44144, 47952, 48000, 48048, 42294, 42336, 45938, 45983, 46034, 46080, 50000, 50050, 88200, 96000
- Bit depth: 16, 24
- Audio file types: BWF (Broadcast Wave format), WAVE (Standard Wave), SDII (Sound Designer II)
- Volume formats: FAT32, NTFS, HFS+
- Automation support: clip based volume, breakpoint volume and mute
- Fade support: fade in, fade out, and cross fade
- Frame rates (Fps): 24/24, 23.976/24, 24.975/25, 25/25, 29.97/DF, 29.97/NDF, 30/DF, 30/NDF

Importing OpenTL files

1. Select “OpenTL...” from the Import submenu of the File menu.
2. Navigate to the location of the OpenTL file, select it and click Open.
3. You are prompted to select or create a project folder for the new project.
After specifying the name and location of the project folder, the new project opens containing all the audio files stored in the OpenTL file and their associated edits. Save the imported file as a Nuendo project.
4. Open the Pool, and select “Prepare Archive...” from the Pool context menu.
This will copy any necessary external audio files into the local Nuendo project directory. For more information, see [“Prepare Archive”](#) on [page 54](#).
5. Select the Save option from the File menu.

Importing XSend projects from Liquid

For Liquid users, XSend provides a means to export a Liquid sequence directly to a Nuendo workstation either on the same machine, over a network or via portable media such as DVD-R.

The XSend options and features are available only if XSend is installed on your computer. You can either install XSend during the Nuendo installation process, or at a later point in time using the XSend installer supplied on the Nuendo program DVD. Also, make sure that the XSend plug-in is activated in the Plug-in Information window.

Proceed as follows to import XSend files:

1. You must designate the XSend Incoming folder by selecting the XSend preferences from the Nuendo File menu.
A dialog opens, allowing you to browse your system to select a folder where exported Liquid projects will be stored.
2. Export the Liquid project to the Nuendo system.
This can be done directly over a network if the two systems are connected by one. No file sharing is needed. All file transfers are handled by XSend. Refer to the Liquid system's documentation for more information on how to do this. You may also export the sequence to portable media such as DVD-R or CD-R discs for transfer when no network is available.
3. On the File menu–Import submenu, select “XSend...”.
Navigate to the exported Liquid sequence which will be an XSD file type.

4. You will be asked if you wish to create a new project. Choose Yes if you want to import the XSend sequence into a blank project. If you choose No, the imported sequence will be appended to the currently active project. The new audio tracks are displayed below the lowest track or channel in the project. In either case, both audio and video files can be included in the XSend sequence, providing a convenient means to receive entire projects from Liquid users.

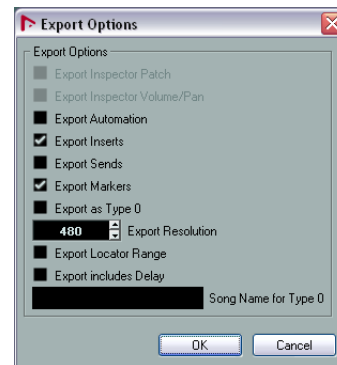
Exporting and importing standard MIDI files

Nuendo can import and export standard MIDI files, which makes it possible to transfer MIDI material to and from virtually any MIDI application on any platform. When you import and export MIDI files, you can also specify whether certain settings associated with the tracks are included in the files (automation tracks, volume and pan settings, etc.).

Exporting MIDI files

To export your MIDI tracks as a standard MIDI file, pull down the File menu and select “MIDI File...” from the Export submenu. A regular file dialog opens, allowing you to specify a location and name for the file.

When you have specified a location and a name for the file, click “Save”. The Export Options dialog opens, allowing you to specify a number of options for the file, e.g. what is included in the file, its type and its resolution (see below for a description of the options).



The Export Options dialog

You will also find most of these settings in the Preferences dialog (MIDI–MIDI File page). If you set these up in the Preferences dialog, you only need to click OK in the Export Options dialog to proceed.

The dialog contains the following options:

Option	Description
Export Inspector Patch	If this is activated, the MIDI patch settings in the Inspector – Bank Select and Program Select (used for selecting sounds in the connected MIDI instrument) are included as MIDI Bank Select and Program Change events in the MIDI file.
Export Inspector Volume/Pan	If this is activated, Volume and Pan settings made in the Inspector are included as MIDI Volume and Pan events in the MIDI file.
Export Automation	If this is activated, the automation data (as heard during playback) are converted to MIDI controller events and included in the MIDI file, see the chapter “Automation” on page 239. This also includes automation recorded with the MIDI Control plug-in (see the separate PDF document “Plug-in Reference”). Note that if a continuous controller (e.g. CC7) has been recorded but the Read button is deactivated for the automation track (i.e. the automation is effectively switched off for this parameter), only the part data for this controller will be exported. If this option is deactivated and the Automation Read button is activated, no Continuous Controllers are exported. If the Read button is deactivated, the Controller data of the MIDI part are exported (these will now be handled like “regular” part data). In most cases it is recommended to activate this option.
Export Inserts	If this is activated and you are using any MIDI plug-ins as insert effects, the modifications to the original MIDI notes that occur as a result of the effect(s) will be included in the MIDI file. A MIDI delay, for example, will produce a number of repeats to a MIDI note by actually adding additional, “echoing” notes at rhythmic intervals – these notes will be included in the MIDI file if the option is activated.
Export Sends	If this is activated and you are using any MIDI plug-ins as send effects, the modifications to the original MIDI notes that occur as a result of the effect(s) will be included in the MIDI file.
Export Markers	If this is activated, any markers you have added (see “Using markers” on page 136) will be included in the MIDI file as standard MIDI file marker events.
Export as Type 0	If this is activated, the MIDI file will be of type 0 (all data on a single track, but on different MIDI channels). If you do not activate this option, the MIDI file will be of Type 1 (data on separate tracks). Which type to choose depends on what you want to do with the MIDI file (in which application or sequencer it should be used, etc.).
Export Resolution	You can specify a MIDI resolution between 24 and 960 for the MIDI file. The resolution is the number of pulses, or ticks, per quarter note (PPQ) and determines the precision with which you will be able to view and edit the MIDI data. The higher the resolution, the higher the precision. Choose the resolution depending on the application or sequencer with which the MIDI file will be used, though, since certain applications and sequencers may not be able to handle certain resolutions.
Export Locator Range	If this is activated, only the range between the locators will be exported.

Option	Description
Export includes Delay	If this is activated, the delay of the MIDI track will be included in the MIDI file. For more information about the Delay option, see “Basic track settings” on page 373.
Song name for Type 0	You can use this text field to change the name of the MIDI file as displayed when loading this file in a keyboard.

⇒ The MIDI file will include the tempo information of the project (i.e. it will include the tempo and time signature events of the Tempo Track Editor or, if the tempo track is deactivated on the Transport panel, the current tempo and time signature).

⇒ Inspector settings other than those specified in the Export options are not included in the MIDI file! To include these, you need to convert the settings to “real” MIDI events and properties by using the Merge MIDI in Loop function for each track, see “Merge MIDI in Loop” on page 397.

Importing MIDI files

To import a MIDI file from disk, proceed as follows:

1. Select “MIDI File...” from the Import submenu of the File menu.
2. If there is already an open project, a dialog opens in which you can select whether a new project is created for the file.
If you select “No”, the MIDI file will be imported into the current project.
3. Locate and select the MIDI file in the file dialog that opens and click Open.

- If you choose to create a new project, select the project folder.
Select an existing project folder or create a new one.

The MIDI file is imported. The result depends on the contents of the MIDI file and the Import Options settings in the Preferences dialog (MIDI–MIDI File page). The Import Options are as follows:

Option	Description
Extract First Patch	If this is activated, the first Program Change and Bank Select events for each track are converted to Inspector settings for the track.
Extract First Volume/Pan	If this is activated, the first MIDI Volume and Pan events for each track are converted to Inspector settings for the track.
Import Controller as Automation Tracks	If this is activated, MIDI controller events in the MIDI file will be converted to automation data for the MIDI tracks. If this is deactivated, controller data for the MIDI Parts will be imported.

Option	Description
Import to Left Locator	If this is activated, the imported MIDI file will be placed so that it starts at the position of the left locator – otherwise it will start at the beginning of the project. Note that if you choose to have a new project created automatically, the MIDI file will always start at the beginning of the project.
Import Markers	If this is activated, standard MIDI file markers in the file will be imported and converted to Nuendo markers.
Import dropped File as single Part	If this is activated and you drag and drop a MIDI file into the project, the whole file will be placed on a single track.
Ignore Master Track Events on Merge	If this is activated and you import a MIDI file into the current project, tempo and signature track data in the MIDI file are ignored. The imported MIDI file will play according to the current tempo and signature tracks in the project. If this option is deactivated, the Tempo Track Editor will be adjusted according to the tempo information in the MIDI file.
Auto Dissolve Format 0	If this is activated and you import a MIDI file of type 0 into the project, the file will automatically be “dissolved”: For each embedded MIDI channel in the file, a separate track will be inserted in the Project window. If this is deactivated, only one MIDI track will be created. This track will be set to MIDI Channel “Any”, allowing all MIDI events to play back on their original channels. You can also use the “Dissolve Part” function on the MIDI menu to distribute the events onto different tracks with different MIDI Channels at a later stage.
Import to Instrument tracks	If this is activated and you drag a MIDI file into the project, an instrument track is created instead of a MIDI track. Furthermore, the program will load the corresponding track preset for the instrument track (based on the program change events included in the MIDI file).

- It is also possible to import a MIDI file from disk by dragging and dropping it from the Windows Explorer or the Mac OS Finder into the Project window. The Import Options apply as well.

Support for the Yamaha XF data format

Nuendo supports the Yamaha XF format. XF is an extension of the standard MIDI file format that allows saving of song-specific data with a MIDI file of type 0.

When importing a MIDI file containing XF data, this data is placed in parts on separate tracks called “XF Data”, “Chord Data”, or “SysEx Data”. You can edit such a part in the List Editor (e.g. to add or change lyrics).

- ⚠ Do not change the order of events within the XF data or the event data itself, unless you have a lot of experience with XF data.

Nuendo can also export XF data as part of a MIDI file of type 0. If you do not want to export the XF data together with the MIDI data, mute or delete the track(s) containing the XF data.

Exporting and importing MIDI loops

Nuendo allows you to import MIDI loops (file extension “.midiloop”) and to save instrument parts as MIDI loops. MIDI loops are handy, as they contain not only MIDI notes and controllers, but also the associated VST instrument and instrument track preset settings.

How to import and export MIDI loops is described in detail in the chapter [“VST instruments and instrument tracks”](#) on [page 215](#).

Exporting and importing track archives

You can export Nuendo tracks (audio, FX, group, instrument, MIDI, and video) as track archives for import into other Nuendo projects. All the information associated with the tracks will be exported (Mixer channel settings, automation tracks, parts and events, etc.). If you select the “Copy” option (see below), a separate “media” folder will be created, containing copies of all referenced audio files.

- ⇒ Project-specific settings (such as tempo) are not part of the exported track archives.
- ⇒ For creating track presets from tracks, see [“Working with track presets”](#) on [page 356](#).

Exporting tracks as track archives

1. Select the tracks you wish to export.
2. Pull down the File menu, open the Export submenu and choose “Selected Tracks...”.
3. You are prompted to choose between two options:
 - Click Copy to include copies of the media files in the export.

A file dialog opens in which you can choose an existing empty folder or create a new folder for saving the track archive (as XML file) and its media subfolder, which will contain any associated audio or video files.

- Click Reference to include merely a reference to the files in the export.

A file dialog opens in which you can choose an existing folder for saving the track archive (as single XML file).

4. Click OK to save the track archive.

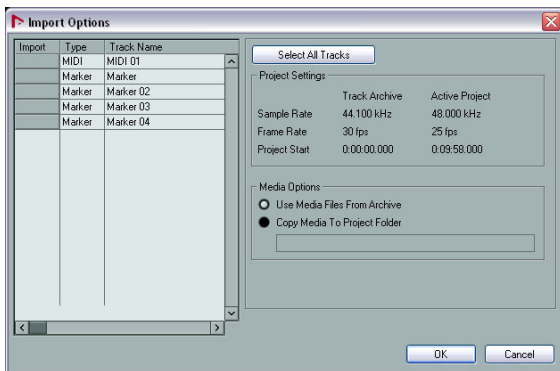
Importing tracks from a track archive

The Import Track Archive function lets you import tracks exported from another Nuendo project.

⇒ Note that the sample rates of the active project and the track archive have to match. If necessary, you have to convert the sample rate, see below.

1. Pull down the File menu, open the Import submenu and select “Track Archive...”.
2. In the file dialog that opens, select the XML file and click Open.

The Import Options dialog opens.



In the Project Settings area, you can see a comparison between the settings of the track archive and the active project.

3. Click in the Import column on the left to select the desired track(s) or click “Select all Tracks”.
A checkmark is shown for all selected tracks.

4. Choose which media files to use.

- Select “Use Media Files From Archive” if you want to import the track without copying the media files into your project folder.
- Select “Copy Media To Project Folder” if you want to import the media files into your project folder.

For the “Perform Sample Rate Conversion” option, see below.

5. Click OK.

The tracks are imported, complete with all contents and settings.

Sample rate conversion on track archive import

A track archive may contain media files with a sample rate that is different from the sample rate of your currently active project. You can see the sample rate difference in the Project Settings area.

- To convert the sample rate of a track archive to the sample rate used in the active project on import, select the “Copy Media To Project Folder” option and then “Perform Sample Rate Conversion”.

⇒ Unconverted files with another sample rate than the one used in the project will play back at the wrong speed and pitch.

Converting audio tracks (multi-channel to mono and vice versa)

Splitting multi-channel tracks

When your project contains multi-channel tracks (e.g. stereo or surround tracks), you can split these into several mono tracks. This is useful in the following situations:

- When you want to export the tracks of your project for further processing in an application that only supports mono tracks.
- When you want to create a project from multi-channel tracks that are not stereo or surround (polyphonic mono). This format is often used for production sound, created by a field recorder, for example.

- When you want to edit individual channels of a multi-channel file.
This allows you to access the individual channels from your remote control console.

The number of mono tracks that is created during this process depends on the number of channels comprised in the multi-channel file. The multi-channel audio material of the source track is split into mono events which are inserted on the new tracks. In the project’s Audio folder, a subfolder called Split is created which contains the new mono files.

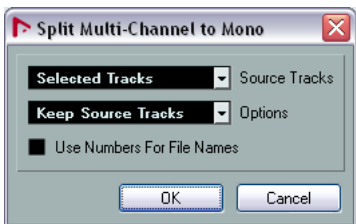
To split a multi-channel track, proceed as follows:

1. If you only want to split particular multi-channel tracks, select them in the Project window.

If you want to split all multi-channel tracks of your project, you do not have to make a selection.

2. On the Project menu, open the Convert Tracks sub-menu and select “Multi-Channel to Mono...”.

A dialog opens.



3. On the Source Tracks pop-up menu, select whether you want to split all or only the selected multi-channel tracks.

4. On the Options pop-up menu, you can specify what happens when the multi-channel file is split.

The following options are available:

Option	Description
Keep Source Tracks	New mono tracks are inserted below the source tracks.
Mute Source Tracks	As above, but the source tracks are muted.
Delete Source Tracks	New mono tracks are inserted and the source tracks are deleted.
Create New Project	A new project is created, containing only the resulting split tracks.

The option below allows you to decide how the created files will be named.

▪ Activate “Use Numbers For File Names” if you want the tracks and files to get the name of the source track, followed by a number.

This is useful if you are working with source files that do not contain stereo or surround material, but polyphonic mono audio.

▪ Deactivate this if you want the file and track names to be followed by letters, denoting the corresponding speaker channels, e.g. “Audio 01_L” and “Audio 01_R”.

This is useful if you are working with true multi-channel files. Note that if the source track was connected to an output bus with a matching channel configuration, the new mono tracks are automatically routed to the corresponding channels within this output bus.

5. Click OK.

The track is split into the corresponding number of mono tracks.

⇒ You can also split several multi-channel tracks simultaneously.

Notes

▪ The number of tracks created always corresponds to the channel configuration of the source track, even if the channel configurations of the source track and the source file do not match. For example if a 5.1 surround file is inserted on a stereo track, two new tracks containing the first two mono files are created. (However, in the project's Audio folder, you will find six mono files, one for each channel in the original 5.1 file.) Likewise, if the source track configuration is 5.1, but contains a stereo file, six tracks are created, but only the first two contain files.

▪ All channel settings of the source tracks are copied to the tracks created by the split operation.

⚠ When a multi-channel source track contains a mono file and you perform a split, this mono file is copied onto the first two destination tracks. However, since panning information is not considered during the split, the volume of the new mono file may not correspond to that of the file on the original track.

Converting mono tracks into multi-channel tracks

Just as it is possible to split multi-channel tracks into separate mono tracks, you can convert mono tracks into multi-channel tracks.

This is useful in the following situations:

▪ When working with dual-mono tracks from other applications, e.g. Pro Tools.

Converting these into interleaved tracks makes further editing and mixing more convenient.

- If you have recorded a stem of multi-mono surround tracks.

Saving the recordings in one interleaved file allows you to assign this “stem” to one single channel in the Mixer (facilitating editing as well as giving you a better overview).

- ⚠ You cannot convert mono tracks containing audio parts. Only audio events are supported.
- ⚠ You cannot convert tracks containing events in Musical mode. Therefore, make sure that Musical mode is not activated for any of the events.

The selected destination format and the order of the tracks in the track list determines which tracks are combined.

Requirements

- The number of source tracks and the destination format must match, i.e. the source tracks must “fit evenly” into a number of multi-channel files of the selected destination format.

4 mono files can be converted into 2 stereo files or into one multi-channel file in LRCS format, for example. The tracks are combined according to their order in the track list (but they do not have to be adjacent). For stereo, the first two mono tracks (counted from the top) make up stereo track 1, the next two make up stereo track 2, and so on.

- The tracks which are combined have to reside on the same level in the track list, i.e. either on the top level or within the same folder track.
- The mono source tracks must match in terms of channel settings and automation, i.e. they must hold the same edits. The program tolerates minor discrepancies (you get a warning message and the settings of the topmost track of each group are used). However, when the channel settings differ considerably, the function cannot be applied. In this case, you should check whether you have selected the correct tracks.

- If the separate audio events have different volume envelopes, these are calculated into the new clip.

- ⚠ You should not raise the level of the source events over 0dB, or clipping will occur in the created files. The only exception to this are files in 32-bit-float format (however, these are not supported by all applications).

⇒ This function always combines the “raw” audio into new files. Therefore, the source tracks must have the same channel settings, otherwise the result would sound differently. To combine mono files with different channel settings, use the Audio Mixdown function instead, see the chapter “Export Audio Mixdown” on [page 473](#).

Performing the conversion

To convert several mono tracks into one or more multi-channel tracks, proceed as follows:

1. If you only want to convert particular mono tracks, select them in the Project window.
If you want convert all mono tracks in your project, you do not have to select them.
2. On the Project menu, Convert Tracks submenu, select “Mono to Multi-Channel...”.
A dialog opens.



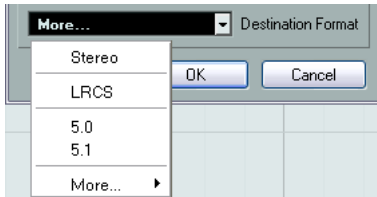
3. On the Source Tracks pop-up menu, specify whether you want to combine all mono tracks in your project or only the selected mono tracks.
4. On the Options pop-up menu, you can specify what happens when the files are combined.

The following options are available:

Option	Description
Keep Source Tracks	A new multi-channel track is inserted below the last source track.
Mute Source Tracks	As above, but the source tracks are muted.
Delete Source Tracks	A new multi-channel track is inserted and the source tracks are removed from the project.
Create New Project	A new project is created, containing one or more multi-channel tracks with the new files.

5. On the Destination Format pop-up menu, select the format for the multi-channel file or files.

Note that the number of selected tracks must match this format. If you have selected fourteen mono tracks, for example, you can select Stereo or one of the 7-channel surround formats. If the number of tracks and the destination format do not match, a warning message is displayed and the process is aborted.



6. Click OK.

The corresponding number of multi-channel tracks is created. Events residing at the same position on the timeline are converted into a multi-channel event on the new track. If the lengths of the source events do not match exactly, the overlap will be included in the new events. In the project's Audio folder, a subfolder called Merge is created which contains the new multi-channel files.

⇒ If the outputs of the mono tracks are routed to separate channels within one output bus, this bus will be selected as output for the multi-channel track.

Clip packages

In postproduction it is common practice to create sounds by combining or "layering" several different sound components (e.g. for explosions, background atmospheres, or effect sounds). Usually, these sound combinations are being reused at a later stage. This might be in the same project (e.g. for recurring situations within one movie), or a different project (such as a later episode of a series or for a different production). When working with these sound combinations, the audio engineers need to be able to modify the separate sound components, in order to make adjustments due to last minute changes in the setup, for example.

Using clip packages in Nuendo

In Nuendo, you can create the above-mentioned "sounds" by arranging, editing and grouping their components (i.e. audio events or parts) in the Project window. These groups can then be selected, moved and copied as one.

However, groups are not reflected in the Pool or the MediaBay. Furthermore, they are restricted to a single project and cannot be exported for use in other projects (other than as audio mixdown).

To be able to manage all components making up a special sound in Nuendo, you can save them in "clip packages". This has the following advantages:

- Clip packages for a project can be easily saved and loaded, e.g. in other projects.
- Clip packages can be archived for later use.
- Clip packages are an easy way to transfer all components of a special sound between users or computers.

Clip packages are container files that include all the selected audio material (as opposed to mere file references). Therefore, they can be used "as they are" without running the risk of using incomplete sounds due to missing files. However, this does not apply to sound content from VST Sound archives, see below.

Considerations

- Clip packages contain copies of the audio files. Any offline processes you applied to the audio are saved in the file and cannot be modified or undone later.
- Clip packages contain volume and pan automation of the audio, as well as any fades, crossfades and volume envelopes. Insert or send effects or EQ settings of the corresponding tracks are not included.
- Imported or exported clip packages are automatically added to the Pool.
- Clip packages contain only the portion of an audio clip that is actually used by an event. This section is extended by 2 seconds at the beginning and the end of the event so that you are still able to adjust the event borders.

⚠ Audio clips set to musical time base (see ["Switching between musical and linear time base"](#) on [page 63](#)) are always copied in entirety into the clip package.

⚠ If a clip package contains audio material from VST Sound archives, this is not copied into the clip package. In this case, a reference to the original VST Sound archive is saved. For these clip packages to work in another project or studio, the referred VST Sound files need to be present on the system.

Creating (exporting) clip packages

When you have created the desired sound in the Project window, you can transform it into a clip package.

Proceed as follows:

1. Select the audio that makes up the sound. You can either select audio events and parts or create a selection range.

If you create a selection range which includes empty space before the audio, this is included in the file.

- If you want to include your automation data in the clip package, make sure to read-enable the corresponding track before exporting the clip package.

⇒ Only audio material will be part of the clip package. If any other material is selected, this will be ignored.

2. On the File menu, open the Export submenu and select “Clip Package...”.

You can set up a key command for this in the Key Commands dialog (File category).

The Export Clip Package dialog opens.



3. In the upper section of the dialog, you specify the folder in which to save the clip package.

- To save the clip package in the default folder (the “Clip Packages” folder within the Project folder), click on the button in the top right of the dialog to open a pop-up menu and select “Use Project’s Clip Packages Folder”.

- To save the clip package in another folder than the default folder, click on the button in the top right of the dialog to open a pop-up menu and select “Choose Folder...”. At the bottom of the menu, the last 5 locations are available.

4. In the Attributes Inspector section, you can specify certain attribute values for your clip package.

To open the Attributes Inspector, click the button at the bottom left of the dialog.

- Click on an attribute value field to open a pop-up menu with the available values or double-click to enter an attribute value as text.

For detailed information on working with attributes, see [“The Attribute Inspector”](#) on [page 347](#).

5. In the Name field at the bottom of the dialog, enter the name for your sound.

6. Click OK to save the clip package and close the dialog.

Previewing clip packages

Clip packages can be previewed in the MediaBay and in the Pool. For this purpose, a mixdown file is created together with the clip package. For the preview file, all events and tracks that are not part of the clip package are muted and all insert effects and EQs are bypassed. Please note that only the Main Mix output bus is used for the mixdown. The mixdown will be in the format set for the Main Mix bus.

In some cases what you hear during preview differs from what you hear when you load the actual clip package. This happens in the following situations:

- If you have included audio events or parts in the clip package that are located on tracks for which the effects have been “frozen” (see [“Freezing \(rendering\) insert effects for a track”](#) on [page 202](#)). These effects will be heard in the preview although they are not part of the clip package.
- If you have included tracks that are set to a different output than the Main Mix bus, these will not be heard in the mixdown although they are part of the clip package.
- If automation data for the Bypass Effect parameter has been recorded for tracks, this effect will be heard in the preview, although it is not part of the actual clip package.

Importing

Clip packages can be imported as follows:

- You can drag and drop clip packages from the Windows Explorer or Mac OS Finder, from the MediaBay or from the Pool into the Project window.
- You can double-click on a clip package in the MediaBay to insert it at the Project cursor.
- You can use the MediaBay context menu and select where to insert the clip package in the active project: at a specific timecode position, at the cursor, the left locator or at origin (the same position as in the original project).
There is one thing to note: When importing a clip package that contains events from tracks set to musical timebase, the musical positions (bars and beats) of the events and not the timecode positions are taken into account. This might not always be what you want (e.g. when working on projects with a different tempo).
- You can open the Import submenu of the File menu, and select “Clip Package...”.

In the dialog that opens, select the clip package you want to import.

- You can select the clip package in the Pool, and select one of the “Insert into Project” options from the Media menu (or the Pool context menu) to insert the package at the corresponding position.
- You can also use the regular Copy and Paste commands to copy a clip package from the Windows Explorer/Mac OS Finder, the MediaBay, or the Pool into the Project window.
- You can add clip packages to the Pool (without inserting them into the project) using the regular import function, see [“About the Import Medium dialog”](#) on [page 329](#).

What happens on import?

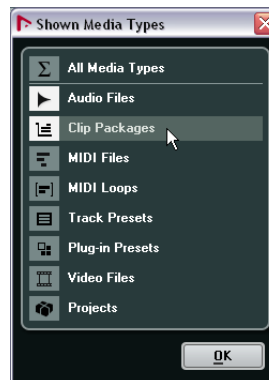
When you import a clip package, the following happens:

- The corresponding audio parts and events are copied to the project folder.
 - In the Project window, events are inserted that correspond to the original events. These events will be grouped.
 - The first event is inserted on the selected track. If no track is selected, new tracks are added below the existing tracks and the events are inserted on these.
- The order of the tracks is the same as in the original project.

- If the sample rate of the audio files within the clip package does not correspond to the sample rate of the project into which it is inserted, the files are automatically converted to the project sample rate.
- If automation data for volume and pan was saved in the clip package, a corresponding automation curve is created together with the event.
On import, you will be asked if you want to insert the automation, allowing you to decide whether you want to replace any existing automation data.
- Automation data for the SurroundPanner is only applied correctly on import when a target track with the correct surround format is selected.

Clip packages in the MediaBay

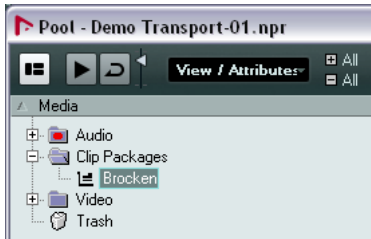
Clip packages can be managed like other media types in the MediaBay, see the chapter [“The MediaBay”](#) on [page 334](#).



- You can filter the MediaBay Results list to show only clip packages.

Clip packages in the Pool

In the Pool, clip packages are available in a separate folder (see the chapter [“The Pool”](#) on [page 320](#)).



- The Pool functions “Prepare Archive”, “Export Pool”, “Import Pool”, and “New Library” will include any clip packages you created or imported.
 - The Info column displays the length of the clip package and the text you entered for the “Content Summary” attribute (if any).
- ⇒ Contrary to other file types, clip packages do not have a direct counterpart in the Project window. When you insert them into a project from within the Pool, the clip packages are separated into the audio events and parts they contain. Therefore, it is impossible to show the selected clip package in the Project window: simply because it does no longer exist as such.

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Customizing

Background

The user can customize the appearance and functionality of Nuendo in various ways.

User configurable items described in this chapter are:

- **Workspaces**

By storing different window combinations as workspaces, you can quickly switch between different working modes – see [“Workspaces” on page 571](#).

- **Setup dialogs**

Several parts of the user interface (toolbars, Transport panel, Inspector, info lines and Channel Settings windows) provide a Setup dialog, where you can configure which items of the respective window area or panel are to be shown or hidden and where they are located – see [“Using the Setup options” on page 572](#).

- **Track list**

The controls shown in the track list can be set for each track type – see [“Customizing track controls” on page 573](#).

- **Configuration of main menu items**

You can hide items not needed on the main menus – see [“Configuring the main menu items” on page 575](#).

- **Appearance**

The general look of the program can be adjusted – see [“Appearance” on page 576](#).

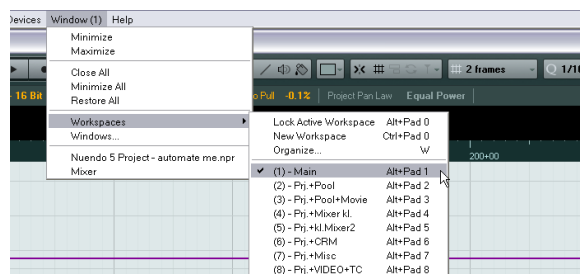
- **Track and event colors**

You can adjust which colors are used – see [“Applying colors in the Project window” on page 577](#).

This chapter also contains a section describing where your preferences and settings are stored (see [“Where are the settings stored?” on page 579](#)), to help you transfer your customized settings to another computer.

Workspaces

A configuration of Nuendo windows is called a “workspace”. A workspace stores the size, position and content of all windows, allowing you to quickly switch between different working modes via the menu or by using key commands. For example, you may want as large a Project window as possible when you are editing, whereas you may want the Mixer and effect windows open during mix-down. Workspaces are listed and managed on the Workspaces submenu of the Window menu.



Editing the active workspace

There is always one workspace active, even if you have not saved any. To make changes to the active workspace, you simply set up the windows as desired – including opening, closing, moving and sizing windows, and adjusting zoom and track height. The changes are automatically stored for the active workspace.

- To keep a workspace from being accidentally changed, select “Lock Active Workspace” from the Workspaces submenu.

A locked workspace will keep its original window settings. You may change the current window layout on the screen, but the next time you select the workspace again, the originally stored layout is recalled.

Creating a new workspace

1. Pull down the Window menu and open the Workspaces submenu.
2. Select “New Workspace”.
3. In the dialog that opens, enter a name for the workspace.
4. Click OK.

The workspace is stored and will appear on the submenu. It is now the active workspace.

5. Set up the windows you want to include in the new workspace.

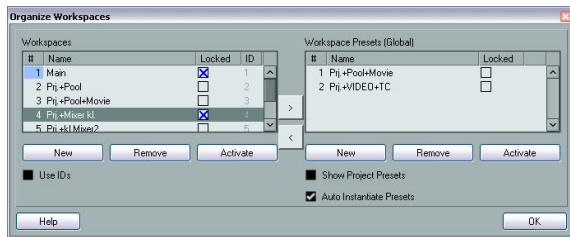
This may include opening, moving and sizing windows, and adjusting zoom and track height.

Activating a workspace

1. Pull down the Window menu and open the Workspaces submenu.
 2. Select a workspace from the list on the submenu.
The windows are closed, opened, moved and/or resized according to the stored workspace.
- You can also activate workspaces by using the corresponding key commands (see [“Key commands”](#) on [page 580](#)).

Organizing workspaces and presets

If you select “Organize...” from the Workspaces submenu, the Organize Workspaces dialog opens.



The list to the left shows the workspaces in the active project, while the list to the right shows the workspace presets. While workspaces are stored with each project, workspace presets can be stored globally, allowing you to set up a number of workspaces for use in any project. Workspace presets store the position and size of the main windows only – project-specific windows are not included.

- In the Workspaces list to the left, you can rename workspaces (by double-clicking and typing) and lock or unlock them.
- The arrow buttons between the two lists allow you to copy the selected workspace to a workspace preset, or vice versa.

- The buttons below each list let you add, remove, or activate workspaces or presets.

You can also activate a workspace or a preset by double-clicking in its number column.

- Normally, when you use key commands to activate workspaces, they relate to the order in the workspace list, e.g. the key command for “Workspace 1” selects the first workspace on the list and so on. However, if you activate the Use IDs checkbox, you can enter a number (1–9) in the ID column for each workspace.

This number will be used as reference when you are using key commands, so that the key command for “Workspace 1” recalls the workspace with ID 1.

- Workspace presets are not only saved globally, but also included in the project. If you open a project on a different system, by default the global presets stored on this system are shown in the list to the right. To see the presets included in your project, activate the “Show Project Presets” option.

- Activate the “Auto Instantiate Presets” option to convert all global workspace presets automatically into workspaces when you create a new project or open a project.

- To close the dialog, click the OK button.

Note that you can continue working in other windows with the Organize Workspaces dialog open.

Using the Setup options

You can customize the appearance of the following elements:

- Transport panel
- Info line
- Channel Settings window
- Toolbars
- Inspector

The setup context menus

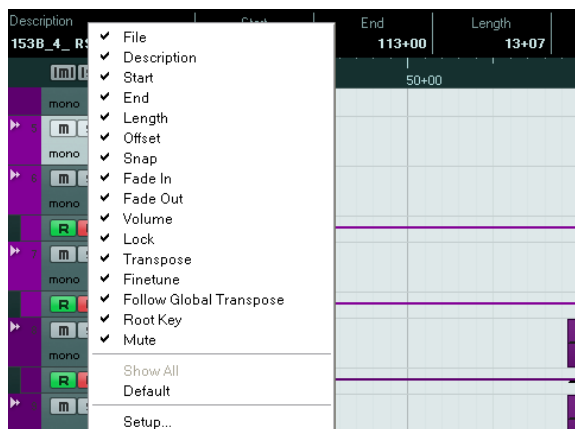
If you right-click the Transport panel, the toolbars, the info lines, or the Inspector, the respective setup context menu opens. For Channel Settings windows, these options are found in the dialog’s context menu, on the Customize View submenu. Here, you can activate/deactivate elements as desired.

The following general options are available on the setup context menus:

- “Show All” makes all items visible.
- “Default” resets the interface to the default setting.

- “Setup...” opens the Setup dialog (see below).

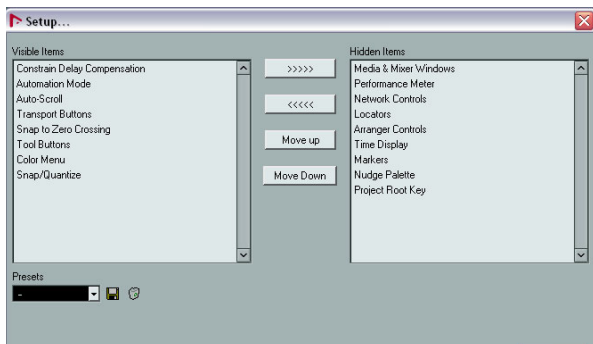
If presets are available, they can be selected on the lower half of the menu.



The info line setup context menu

The Setup dialogs

If you select “Setup...” from the setup context menus, the Setup dialog opens. This allows you to specify which elements are visible/hidden and to set the order of the elements. You can also save and recall setup presets in this dialog.



The dialog is divided into two sections. The left section displays the currently visible items and the right section displays the currently hidden items.

- You can change the current show/hide status by selecting items in one section and then use the arrow buttons in the middle of the dialog to move them to the other section. Changes are applied directly.

- By selecting items in the “Visible Items” list and using the Move Up and Move Down buttons, you can reorder the items list.

Changes are applied directly. To undo all changes and revert to the standard layout, select “Default” on the setup context menu.

- If you click the Save button (disk icon) in the Presets section, a dialog opens, allowing you to name the current configuration and save it as a preset.

- To remove a preset, select it on the presets pop-up menu and click the trash icon.

- Saved configurations are available for selection from the Presets pop-up menu in the Setup dialog or directly from the setup context menu.

Customizing track controls

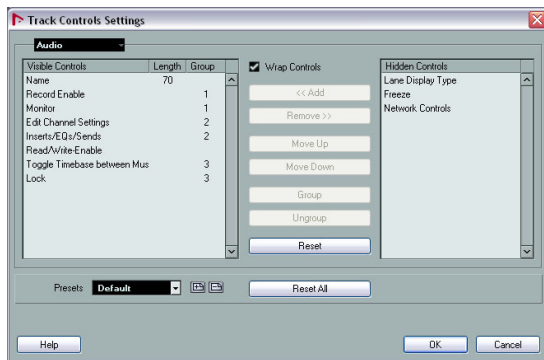
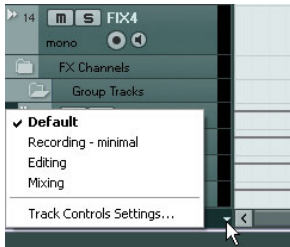
For each track type you can configure which track controls are shown in the track list. You can also specify the order of controls and group controls so that they are always shown adjacent to each other. This is done using the Track Controls Settings dialog.

Opening the Track Controls Settings dialog

There are two ways to open the dialog:

- Right-click a track in the track list and select “Track Controls Settings...” from the context menu.

- Click the arrow in the bottom right corner of the track list and select “Track Controls Settings...”.

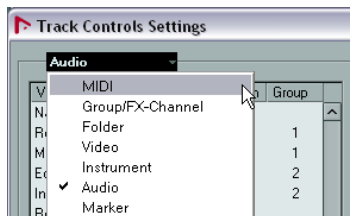


Setting the track type

The settings made in the Track Controls Settings dialog apply to the selected track type, which is shown in the menu display in the top left corner of the dialog.

- To change the track type, click the arrow to the right in the menu display and select a track type from the pop-up menu.

All settings made in the dialog will apply to all tracks (current and subsequent) of the selected type.



The Track Type pop-up menu in the Track Controls Settings dialog

- ⇒ Always make sure that you have selected the desired track type when editing the track controls!

Removing, adding, and moving track controls

The dialog is divided into two sections. The left section displays controls currently visible in the track list, and the right section displays the controls currently hidden.

- You can hide controls from the track list by selecting them in the list to the left and clicking the Remove button. To show hidden elements, select them in the list to the right and click the Add button. Click OK to apply the changes.

⇒ All controls can be removed except the Mute and Solo buttons.

- By selecting controls in the “Visible Controls” list and using the Move Up and Move Down buttons, you can change the order of the list. Click OK to apply the changes.

Grouping track controls

If you resize the track list, the position of the controls will change dynamically to accommodate as many controls as possible in the available space (given that Wrap Controls is activated – see below). By grouping several track controls you ensure that they are always positioned side by side in the track list.

To group controls, proceed as follows:

1. Make sure that you have selected the correct track type.
2. In the “Visible Controls” section, select at least two controls. You can only group controls that are adjacent to each other in the list. To group controls that are currently not adjacent in the list, use the Move Up/Down buttons first.
3. Click Group. A number is displayed in the Group column for the grouped controls. The first group created has the number 1, the second 2, and so on.
4. Click OK. The controls are now grouped.

- You can ungroup controls by using the Ungroup button. Please note that this will remove the selected element and the elements below it in the list from this group. To remove an entire group, select the first (topmost) element belonging to this group and click the Ungroup button.

About Wrap Controls

This is activated by default. Wrap Controls allows the controls to be dynamically repositioned when resizing the track list. That is, as many controls as possible will be displayed depending on the current size of the track list.

If you deactivate Wrap Controls, the positions of the controls are fixed, regardless of the size of the track list. In this mode, you may have to resize the tracks vertically (by dragging the dividers between them) to display all the controls.

About the Length column

The Length column in the Visible Controls list allows you to set the maximum length for certain text fields, e.g. Name. To change the setting, click on the number in the Length column and type in a new value.

Resetting track list settings

You have two possibilities to reset the settings:

- Click Reset to restore all default track controls settings for the selected track type.
- Click Reset All to restore all default track controls settings for all track types.

Saving presets

You can save track controls settings as presets for later recall:

1. Click on the Save button (the “+” sign) to the right of the Presets pop-up menu.

A dialog opens, asking you to type in a name for the preset.

2. Click OK to save the settings as a preset.

Saved presets are available for selection from the Presets pop-up menu and from the pop-up menu in the top left corner of the track list.

- To remove a preset, select it in the Track Controls Settings dialog and click the Delete button (the “-” sign).

⇒ Nuendo comes with a number of Track Controls Settings presets available.

Configuring the main menu items

⚠ Configuring the main menus is a feature intended for experienced Nuendo users. Do not hide menus or menu items unless you are sure that you do not need them!

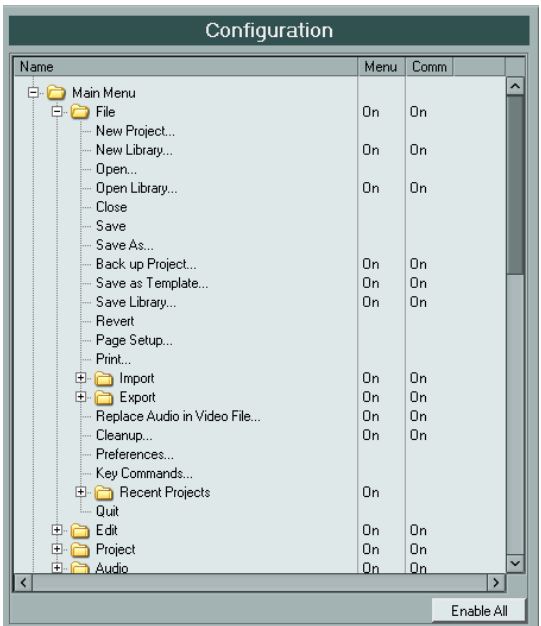
You can configure what items are shown on the main menus and submenus, and even hide entire menus. By customizing the menus you can hide items relating to program functions you never use, to customize the program according to your needs. For example, if you never use the Networking features in Nuendo, you can hide the entire Network menu from view.

1. Open the Preferences dialog and select the Configuration page.

The Configuration page contains two parent folders; “Main Menu”, which contains folders for all main menus, and “Command Categories” which contains folders for all Command categories. This section will only describe how to configure Main Menu items, not Command Categories, see [“Turning key commands off”](#) on [page 582](#).

2. Click on the “+” sign for a folder item, e.g. the File folder.

As you can see, all commands and submenus on the File menu are listed in the Name column.



- In the Menu column you can decide which File menu items to hide from view, by clicking in the column beside the corresponding menu item you wish to hide. If you click the “On” item in the Menu column for an item, it changes to “Off” and vice versa. All menu items set to “Off” will be hidden when you click Apply or OK.

- Certain essential menu items on the File and Edit menus cannot be hidden, such as Save, Open, Close, Undo/Redo, etc. For these items there is no entry in the Menu column.

- If you set a main menu folder (as opposed to a menu item) to Off in the Menu column, the entire menu will be hidden from view. The exception to this is if the main menu folder contains non-removable menu items, in which case all hideable items on the menu will be set to Off, but the menu will still be visible.

- The Command column sets the key command On/Off status for the corresponding menu item. If this is set to Off, any assigned key command for the item will be disabled (see “Turning key commands off” on page 582 for more information).

- You can save menu configurations as preference presets, either separately or together with other Preferences dialog settings.

- By using the above methods, you can customize all main menus to your liking. To apply the changes without exiting the dialog click “Apply”. Click OK to apply the changes and exit the dialog.

- To restore all menu items to their default setting (which is visibility and key commands on for all menus and menu items), click the Defaults button. Note that the Defaults button only restores the settings on the currently selected page (the Configuration page in this case) to their default settings. If you have changed settings on another page of the Preferences dialog, these are not reset.

Appearance

In the Preferences dialog, you find a page called Appearance. It contains the following subpages:

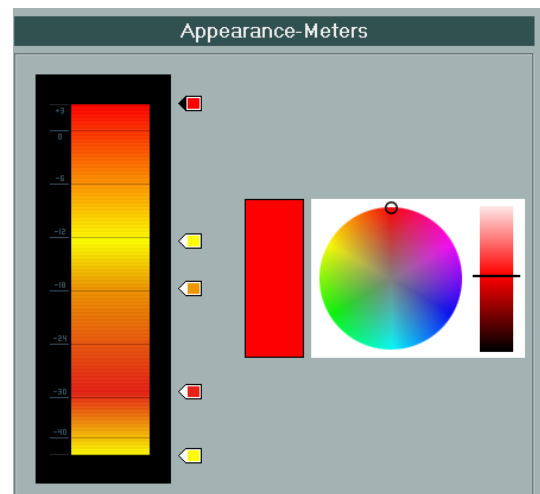
General

The controls on the General page affect the appearance of the windows that surround the controls and workspaces in Nuendo.

- Color Intensity determines how rich the background colors are, from gray to blue.
- Color Lightness lightens or darkens the background.
- The Color Tone slider changes the background color.
- Button Brightness can be used to separately lighten or darken the buttons.

Meters

The coloring of meters in Nuendo can be controlled in sophisticated ways. Multiple colors can help to visually indicate what levels are being reached, e.g. in a channel of the VST Mixer. To do this, the meter on the Appearance–Meters page has color handles that allow you to define what color the meter will have at a given signal level.



The Appearance–Meters page in the Preferences dialog

- The default setting has two color handles. Each color handle has a unique color that gradually shifts as the meter moves toward the next color handle.
You can click on any color handle and move its position on the meter scale. If you hold down [Shift] while moving the handle with the mouse, it will move ten times slower for more precise positioning. You may also nudge the color handle's position with the Arrow Up/Down keys. Holding [Shift] while nudging will move the color handle ten times faster.
- You can add color handles by [Alt]/[Option]-clicking anywhere along the side of the meter scale. To remove a color handle, [Ctrl]/[Command]-click the handle.
By adding more color handles to the meter scale, you can define colors for more specific signal levels. Try adding two color handles very close to one another. You can make the meter color change more rapidly at a specific signal level this way.
- To change the color of a handle, select the handle by either clicking on it or by jumping to it with the [Tab] key (hold down [Shift] and press the [Tab] key to jump backwards). Then use the hue and brightness controls on the right side to alter the handle's color.
The currently selected color handle is indicated by a black triangle on its left side.

Work Area

The work areas in Nuendo are those places where the actual data are displayed such as the Project window event display. In these areas, there are items such as vertical and horizontal grid lines that can be altered in intensity by the controls found on this page.

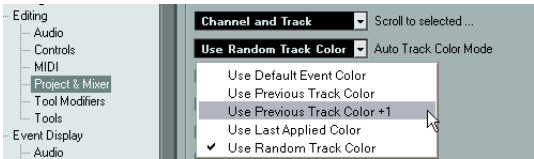
Applying colors in the Project window

You can use color scheming for an easier overview of tracks and events in the Project window. Colors can be applied individually to tracks and events/parts. If you color a track, the corresponding events and parts are displayed in the same color. However, you can also color events and parts differently, “overriding” the applied track color.

In the following sections you will learn how to set up preferences to color tracks automatically, how to color parts or events manually, how to determine whether you want to color the events themselves or their background, and how to customize the color palette for selecting colors.

Applying track colors automatically

In the Preferences dialog (Editing–Project & Mixer page), you can find the “Auto Track Color Mode” option.



This offers you several options for automatically assigning colors to tracks that are added to the project.

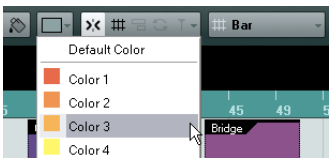
Option	Effect
Use Default Event Color	The default color (gray) is assigned.
Use Previous Track Color	Analyzes the color of the selected track and uses the same color for the new track.
Use Previous Track Color +1	Analyzes the color of the selected track and uses the color that comes next in the color palette for the new track.
Use Last Applied Color	Uses the color that is selected in the Select Colors pop-up menu.
Use Random Track Color	Uses the color palette as a basis to assign track colors randomly.

Coloring tracks, parts, or events manually

You can color each track, part, or event in the Project window individually by using the Select Colors pop-up menu on the toolbar. Parts and events can also be colored using the Color tool.

About the Select Colors pop-up menu

1. In the Project window, select the item you want to color. You can select tracks, parts, or events.
2. On the toolbar, open the Select Colors pop-up menu and select a color.
The selected color is applied to all selected items. However, note that the selected tracks are ignored when you use the Select Colors pop-up menu to color the selected parts or events.



About the Color tool

1. Open the Select Colors pop-up menu and select a color.
2. On the toolbar, select the Color tool.



3. Click on the desired parts and events to assign the color.

The color is applied to the parts and events and overrides the default track color (if used).

- If you press [Ctrl]/[Command] and click on a part/event with the Color tool, a color palette is displayed allowing you to select a color for the event.
- If you press [Alt]/[Option], the Color tool cursor becomes a pipette, which can be used to select the current color of a part/event in order to apply it to another part/event.

About the Similar Tracks options

You can use the selected color of one track to colorize other tracks of the same type (e.g. all audio tracks).

Set up the desired color for a track of a certain track type and right-click this track in the track list to open a context menu. Depending on your settings and selections you can choose one of the following options:

- Use Color for Similar Tracks

When you select this, all tracks of the same type get the same color.

- Use Color for Similar Selected Tracks

Use this to apply the same color to tracks within a selection. The color of the topmost track in the selection is then applied to other tracks of the same type within the selection.

Customizing the event background

On the Event Display page in the Preferences dialog, you find the “Colorize Event Background” option.



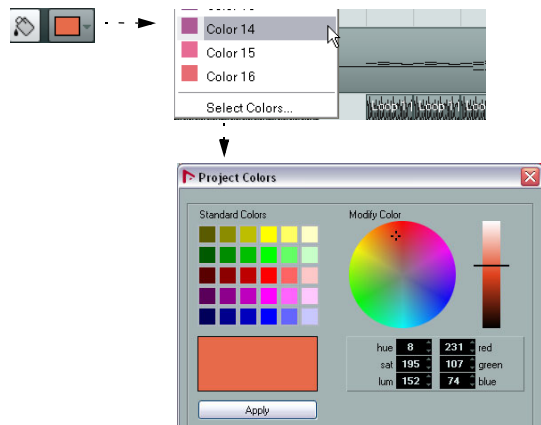
This option affects the display of events in the Project window.

- When this is activated, the events and parts in the event display will have the selected background color.
- When this is deactivated, the event “content” (e.g. MIDI events or audio waveforms) is displayed in the selected color and the event background is gray.

The Project Colors dialog

In the Project Colors dialog you can select a different set of colors for items in the Project window.

To open the Project Colors dialog, open the Select Colors pop-up menu on the toolbar and choose “Select Colors...”.



Adding and editing individual colors

In the Project Colors dialog, you can fully customize the color palette. To add new colors to the color palette, proceed as follows:

1. Add a new color by clicking the Insert New Color button.



2. In the Project Colors section, click the newly created color field to activate the new color for editing.

3. Use the Standard Colors or Modify Color sections to specify a new color.

To do this, pick a different color from the color palette, drag the cursor in the color circle, move the handle in the color meter, or enter new RGB values as well as values for hue, saturation, and luminosity manually.

4. Click the Apply button.

The color setting is applied to the selected color field in the Project Colors section.

⇒ Every color in the Project Colors section can be edited this way.

Setting intensity and brightness

To increase or decrease the intensity and the brightness of all colors, use the corresponding buttons in the Project Colors section.

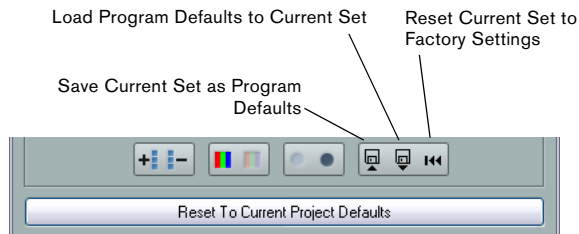
Increase/decrease intensity for all colors



Increase/decrease brightness for all colors

Saving and resetting color settings

- To return to your project colors, click the “Reset To Current Project Defaults” button.
- To save the current set as default, click the “Save Current Set as Program Defaults” button.
- To apply the default set, click the “Load Program Defaults to Current Set” button.
- To return to Nuendo’s standard color palette, click the “Reset Current Set to Factory Settings” button.



Where are the settings stored?

As you have seen, there are a large number of ways in which you can customize Nuendo. While some of the settings you make are stored with each project, others are stored in separate preference files.

If you need to transfer your projects to another computer (e.g. in another studio), you can bring all your settings along by copying the desired preference files and installing them on the other computer.

⇒ It is a good idea to make a backup copy of your preference files once you have set things up the way you want! This way, if another Nuendo user wants to use his or her personal settings when working on your computer, you can restore your own preferences afterwards.

- Under Windows XP, preference files are stored in the folder “\Documents and Settings\<user name>\Application Data\Steinberg\Nuendo 5\”.

If you run the 64 bit version of Nuendo, this folder is called “Nuendo 64bit”. On the Start menu, you will find a shortcut to this folder for easy access.

- Under Windows Vista and Windows 7, preference files are stored in the following location: “\Users\<user name>\AppData\Roaming\Steinberg\Nuendo 5\”.
- On the Start menu, you will find a shortcut to this folder for easy access.

- Under Mac OS X, preference files are stored in the following location: “/Library/Preferences/Nuendo 5/” under your home directory.

The full path is: “/Users/<user name>/Library/Preferences/Nuendo 5/”.

⇒ The RAMpresets.xml file, which contains various presets settings (see below), is saved when exiting the program.

⇒ Program functions (e.g. crossfade) or configurations (e.g. panels) not used in the project will not be stored.

Some of the preferences are not stored in the default preferences folder. A list can be found in the article “Files for the program settings and preferences” in the Steinberg Knowledge Base.

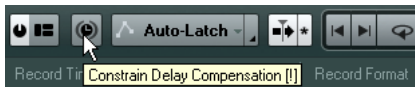
To open the Knowledge Base, browse to the Steinberg web site, click “Support” and choose “Knowledge Base” in the list on the left.

Introduction

Most of the main menus in Nuendo have key command shortcuts for certain items on the menus. In addition, there are numerous other Nuendo functions that can be performed via key commands. These are all default settings.

You can customize existing key commands to your liking, and also add commands for many menu items and functions that currently have no key command assigned.

You can find out for which functions key commands can be assigned by looking in the Key commands dialog (see below), or by checking the tooltip for a particular interface element. If a tooltip shows [!] at the end, you can assign a key command to this function. Assigned key commands are shown in the tooltips in square brackets.



⚠ You can also assign tool modifier keys, i.e. keys that change the behavior of various tools when pressed. This is done in the Preferences dialog – see [“Setting up tool modifier keys”](#) on [page 586](#).

How are key commands settings saved?

Every time you edit or add any key command assignment, this is stored as a global Nuendo preference – not as part of a project. If you edit or add a key command assignment, any subsequent projects that you create or open will use these modified settings. However, the default settings can be restored at any time by clicking the Reset All button in the Key Commands dialog.

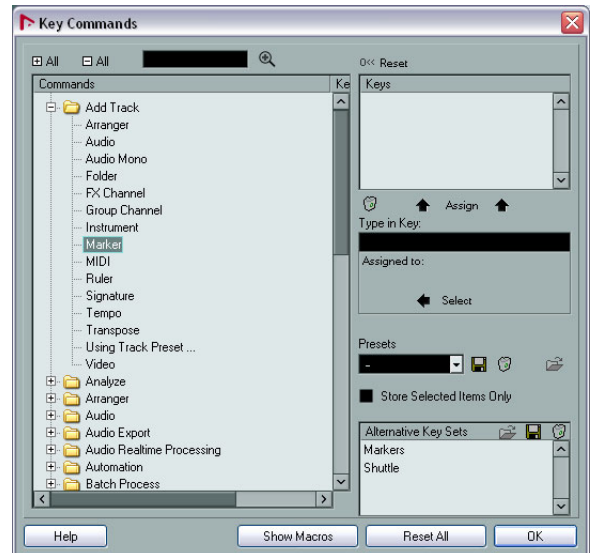
In addition, you can save complete or partial key commands settings as a “key commands file”, which is stored separately and can be imported into any project. This way you can quickly and easily recall customized settings, when moving projects between different computers, for example. The settings are saved in an XML file on the hard disk.

How to save key commands settings is described in the section [“Saving complete key commands settings as presets”](#) on [page 584](#).

Setting up key commands

Adding or modifying a key command

In the Key Commands dialog you will find all main menu items and a large number of other functions, arranged in a hierarchical way similar to the Windows Explorer and Mac OS Finder. The function categories are represented by a number of folders, each containing various menu items and functions. When you open a category folder by clicking the “+” sign beside it, the items and functions it contains are displayed with the currently assigned key commands.

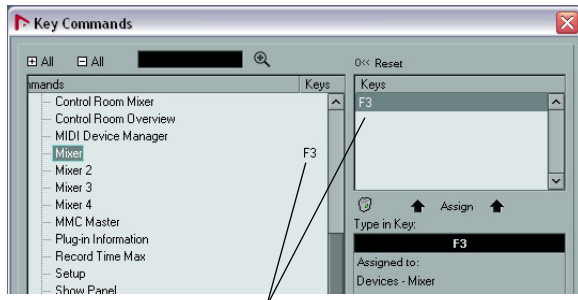


To add a key command, proceed as follows:

1. Pull down the File menu and select “Key Commands...”.
 2. In the Commands list on the left, choose a category.
 3. Click the “+” sign to open the category folder and display the items it contains.
- Note that you can also click the “global” “+” and “-” signs in the top left corner to open and close all category folders at once.

4. In the list, select the item to which you want to assign a key command.

Already assigned key commands are shown in the Keys column as well as in the Keys section in the top right corner.



Key commands are displayed here.

5. Alternatively, you can use the search function in the dialog to find the desired item.

For a description of how to use the search function, see below.

6. When you have found and selected the desired item, click in the “Type in Key” field and enter a new key command.

You can choose any single key or a combination of one or several modifier keys ([Alt]/[Option], [Ctrl]/[Command], [Shift]) plus any key. Just press the keys you want to use.

7. If the key command you enter is already assigned to another item or function, this is displayed below the “Type in Key” field.

You can either ignore this and proceed to assign the key command to the new function instead, or you can select another key command.

8. Click the Assign button above the field.

The new key command appears in the Keys List.

- ⚠ If the key command you enter is already assigned to another function, you will get a warning message asking if you really want to reassign the command to the new function.

9. Click OK to exit the dialog.

⇒ You can set up several different key commands for the same function. Adding a key command to a function that already has another key command will not replace the key command previously defined for the function. If you wish to remove a key command, see below.

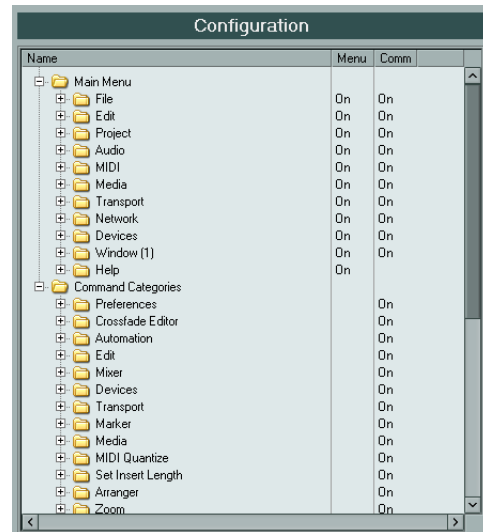
Turning key commands off

Nuendo also gives you the option of turning key commands off, meaning that even if a function has a key command assigned to it, you can disable the key command.

To turn off a key command, proceed as follows:

1. Open the Preferences dialog from the File menu (under Mac OS X it is located on the Nuendo menu) and select the Configuration page.

As you can see, the Configuration page contains two main folders; “Main Menu” and “Command Categories”.



- The “Main Menu” folder contains a number of subfolders, which each contain items found on the main menus in Nuendo.
- The “Command Categories” folder also contains a number of subfolders, each of which contains a number of program functions not available on any of the main menus.

All the items and functions in the subfolders can have key commands assigned to them. The column to the right, labeled “Command”, allows you to set the On/Off status for the corresponding items. This indicates whether it is possible to use assigned key commands for the items or not.

2. Click on the “+” sign beside one of the main folders to open it and list the subfolders it contains.

3. Open the desired subfolder by clicking its “+” sign, navigate to the item for which you want to disable the assigned key command, and select it.

4. Click in the “Command” column beside the item to set the status to “Off”.

Now it will not be possible to use any key command assigned to that menu item or function.

5. Repeat this for all items or functions for which you want to disable key commands.

⇒ Note that if you set an entire subfolder to “Off” in this way, all the items or functions it contains will automatically be set to “Off” as well. If this is not what you want, you can reset separate items in the subfolder to “On”.

6. When you're done, click OK to close the Preferences dialog and apply the changes.

Searching for key commands

If you want to know which key command is assigned to a certain function in the program, you can use the Search function in the Key Commands dialog:

1. Click in the search text field at the top left of the dialog and type in the function for which you want to know the key command.

This is a standard word search function, so you should type the command as it is spelled in the program. Partial words can be used; to search for all quantize related commands, type “Quantize”, “Quant”, etc.

2. Click the Search button (the magnifying glass icon).

The search is conducted and the first matching command is selected and displayed in the Commands list below. The Keys column and the Keys list show the assigned key commands, if any.

3. To search for more commands containing the word(s) you entered, click the Search button again.

4. When you are done, click OK to close the dialog.

Removing a key command

To remove a key command, proceed as follows:

1. Use the list of categories and commands to select the item or function for which you wish to remove a key command.

The key command is shown in the Keys column and the Keys list.

2. Select the key command in the Keys list and click the Delete button (the trash icon).

You are asked whether you really want to remove the key command.

3. Click Remove to remove the selected key command.
4. Click OK to close the dialog.

Setting up macros

A macro is a combination of several functions or commands to be performed in one go. For example, you can select all events on the selected audio track, remove DC offset, normalize the events and duplicate them, all with a single command.

Macros are set up in the Key Commands dialog as follows:

1. Click the Show Macros button.

The macro settings are shown in the lower part of the dialog. To hide these from view, click the button (now renamed Hide Macros) again.

2. Click New Macro.

A new, unnamed macro appears in the Macros list. Name it by typing the desired name. You can rename a macro at any time by selecting it in the list and typing in a new name.

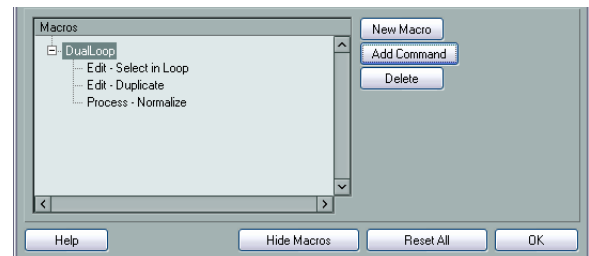
3. Make sure that the macro is selected, and use the categories and commands in the upper half of the dialog to select the first command you want to include in the macro.

4. Click Add Command.

The selected command appears in the list of commands in the Macros section.

5. Repeat the procedure to add more commands to the macro.

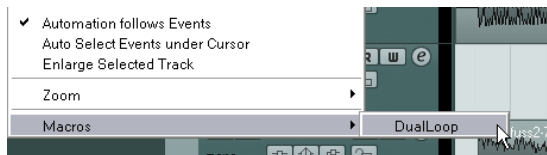
Note that commands are added after the currently selected command in the list. This allows you to insert commands “in the middle” of an existing macro.



A macro with three commands

- To remove a command from the macro, select it in the Macros list and click Delete.
- Similarly, to remove an entire macro, select it in the Macros list and click Delete.

After you have closed the Key Commands dialog, all macros you have created appear at the bottom of the Edit menu in the Macros submenu, available for instant selection.



You can also assign key commands to macros. All macros you have created appear in the upper section of the Key Commands dialog under the Macros category – just select a macro and assign a key command as with any other function.

Saving complete key commands settings as presets

As mentioned above, any changes made to the key commands (and macros) are automatically stored as a Nuendo preference. However, it is also possible to store key commands settings separately. This way, you can store any number of different key command settings, complete or partial, as presets for instant recall.

Proceed as follows:

1. Set up the key commands and macros to your liking. When setting up key commands, remember to click “Assign” to make the changes.

2. Make sure that “Store Selected Items Only” is not activated.

This option is for saving partial key commands settings only (see below).

3. Click the Save button next to the Presets pop-up menu.

A dialog opens, allowing you to type in a name for the preset.

4. Click OK to save the preset.

Your saved key commands settings are now available on the Presets pop-up menu.

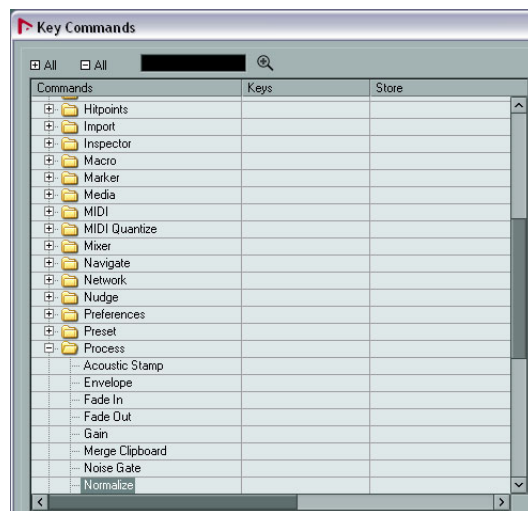
Saving partial key commands settings

It is also possible to save partial key commands settings. This is useful for example if you have made settings that only relate to a specific project or settings that you wish to apply only in certain situations. When you apply a saved partial preset you only change the specific saved settings, while all other key commands settings will be left unchanged.

When you have set up the key commands and macros, proceed as follows to save the partial settings as a preset:

1. Activate the “Store Selected Items Only” option.

When this is activated, a new “Store” column appears in the Commands list.



2. Click in the Store column for the key commands items you wish to save.

Note that if you check an entire category folder (as opposed to separate commands) all commands it contains will automatically also be selected. If this is not what you want, deselect the commands you do not want to include.

3. Click the Save button (the disk icon) next to the Presets pop-up menu.

A dialog opens, allowing you to type in a name for the Preset.

4. Click OK to save.

Your saved key commands settings will now be available from the Preset pop-up menu for your future projects.

Loading saved key command settings

To load a key command preset, simply select it from the Presets pop-up menu.

⇒ The key command settings you load will replace the current key command settings for the same functions (if any). If you have macros of the same name as those stored in the preset you load, these will be replaced too. If you want to be able to revert to your current settings again, make sure to save them first, as described above!

Loading earlier key commands settings

If you have saved key commands settings with an earlier program version, it is possible to use them in Nuendo 5, by using the “Import Key Command File” function, which lets you load and apply saved key commands or macros:

1. Open the Key Commands dialog.
2. Click the “Import Key Command File” button to the right of the Presets pop-up menu.

A standard file dialog opens.



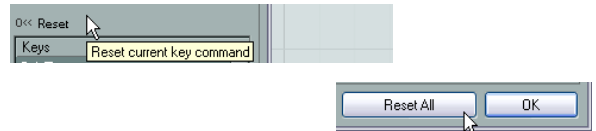
3. In the file dialog, use the “Files of type” pop-up menu to specify if you want to import a key commands file (“key”) or a macro commands file (extension “.mac”).
When you have imported an older file, you might want to save it as a preset (see above) to be able to access it from the Presets pop-up menu in the future.

4. Navigate to the file you want to import and click “Open”.
The file is imported.

5. Click OK to exit the Key Commands dialog and apply the imported settings.

The settings in the loaded key commands or macros file now replace the current settings.

About the “Reset” and “Reset All” functions



These two buttons in the Key Commands dialog will both restore the default settings. The following rules apply:

- “Reset” will restore the default key command setting for the function selected in the Commands list.
- “Reset All” will restore the default key commands for all commands.

⚠ Note that the “Reset All” operation will cause any changes made to the default key commands to be lost! If you want to be able to revert to these settings again, make sure to save them first!

Using Alternative Key Sets

As an alternative to saving and loading key commands settings as previously described, you can set up and save “alternative key sets”. This allows you to switch between different key commands settings “on the fly” while you are working in the program, instead of having to go into the Key Commands dialog to change them.

About the preset Alternative Key Sets

By default, Nuendo contains two different key sets:

- “Markers” is actually not an alternative key set, but rather the default key set that you can switch back to at any time (see below).
- “Shuttle” is a specialized, alternative key set containing key commands settings for all of the Transport panel’s Shuttle controls.

You can edit and save these under the same names to replace them with your own settings if you wish, but it is advised that you instead create additional key sets for your specific needs.

Saving an Alternative Key Set

Here's how to create and save an Alternative Key Set:

1. Open the Key Commands dialog from the File menu.
2. Set up the key commands and macros the way you want them.
3. Decide whether you want to save complete or partial settings by activating/deactivating "Store Selected Items Only".
4. Click the Store Alternative Set button (the disk icon) in the Alternative Key Sets section.

A dialog opens, allowing you to type in a name for the Preset.



5. Type in a name for the key set and click OK to save it. The saved key set appears in the list of alternative key sets.

Editing an Alternative Key Set

To edit a saved key set, proceed as follows:

1. Select the key set in the list and click the "Open" button (the folder icon) in the Alternative Key Sets section. The key set is now activated, and the key commands settings are changed accordingly.
2. Make the desired changes.
3. Click the Store Alternative Set button (the disk icon) in the Alternative Key Sets section. The key set is saved with the updated settings.

Removing a saved Alternative Key Set

- To remove a saved key set, select it in the list and click the "Remove" button (the trash icon) in the Alternative Key Sets section. A dialog opens asking if you want to remove the key set or cancel the operation.

Switching between Alternative Key Sets

You switch between different key sets in the program by using the key command assigned to the function "Toggle Alternate Key Commands", located in the File subfolder in the Key Commands dialog.

The default key command for this function is [Ctrl]/[Command]-[F5], but you can of course change this to any key command that suits you best. See ["Adding or modifying a key command"](#) on [page 581](#) for instructions on how to change key commands.

- When you press the key command for the function, the name of the loaded key set is briefly shown on top of the Project window.
- Each time you press the key command, you switch to the next available alternative key set.

Setting up tool modifier keys

A tool modifier key is a key you can press to get an alternate function when using a tool. For example, clicking and dragging an event with the Arrow tool normally moves it – holding down a modifier key (by default [Alt]/[Option]) while dragging will copy it instead.

The default assignments for tool modifier keys can be found in the Preferences dialog (Editing–Tool Modifiers page). Here, you can also edit them:

1. Open the Preferences dialog and select the Editing–Tool Modifiers page.



2. Select an option in the Categories list, and locate the action for which you want to edit the modifier key.
For example, the "Copy" action mentioned above resides in the category "Drag & Drop".
3. Select the action in the Action list.
4. Hold down the desired modifier key(s) and click the Assign button.
The current modifier keys for the action are replaced. If the modifier keys you pressed are already assigned to another tool, you will be asked whether you want to overwrite them. If you do, this will leave the other tool without any modifier keys assigned.
5. When you're done, click OK to apply the changes and close the dialog.

The default key commands

Below, the default key commands are listed according to category.

⚠ Nuendo Expansion Kit only: When the Virtual Keyboard is displayed, the usual key commands are blocked because they are reserved for the Virtual Keyboard. The only exceptions are: [Ctrl]/[Command]-[S] (Save), Pad [*] (Start/Stop Record), [Space] (Start/Stop Playback), Pad [1] (Jump to left locator), [Delete] or [Backspace] (Delete), Pad [/] (Cycle on/off), [F2] (Show/Hide Transport panel), and [Alt]/[Option]-[K] (Show/Hide Virtual Keyboard).

- Note that it is possible to switch key commands for menu items and other functions on and off, see ["Turning key commands off"](#) on [page 582](#).

Audio category

Option	Key command
Adjust Fades to Range	[A]
Auto-Grid	[Shift]-[Q]
Crossfade	[X]
Find Selected in Pool	[Ctrl]/[Command]-[F]

Automation category

Option	Key command
Open Panel	[F6]
Redo Pass	[Ctrl]/[Command]-[Alt]/[Option]-[Shift]-[Z]
Toggle Read Enable All Tracks	[Alt]/[Option]-[R]
Toggle Write Enable All Tracks	[Alt]/[Option]-[W]
Undo Pass	[Ctrl]/[Command]-[Alt]/[Option]-[Z]

Devices category

Option	Key command
Mixer	[F3]
Video	[F8]
Virtual Keyboard (Nuendo Expansion Kit only)	[Alt]/[Option]-[K]
VST Connections	[F4]
VST Instruments	[F1 1]
VST Performance	[F1 2]

Edit category

Option	Key command
Auto-Scroll	[F]
Copy	[Ctrl]/[Command]-[C]
Cut	[Ctrl]/[Command]-[X]
Cut Time	[Ctrl]/[Command]-[Shift]-[X]
Delete	[Delete] or [Backspace]
Delete Time	[Shift]-[Backspace]
Duplicate	[Ctrl]/[Command]-[D]
Edit In-Place	[Ctrl]/[Command]-[Shift]-[I]
Group	[Ctrl]/[Command]-[G]
Insert Silence	[Ctrl]/[Command]-[Shift]-[E]
Left Selection Side to Cursor	[E]
Lock	[Ctrl]/[Command]-[Shift]-[L]
Move to Cursor	[Ctrl]/[Command]-[L]
Mute	[M]
Mute Events	[Shift]-[M]
Mute/Unmute Objects	[Alt]/[Option]-[M]
Open Default Editor	[Ctrl]/[Command]-[E]
Open Score Editor (Nuendo Expansion Kit only)	[Ctrl]/[Command]-[R]
Open/Close Editor	[Return]

Option	Key command
Paste	[Ctrl]/[Command]-[V]
Paste at Origin	[Alt]/[Option]-[V]
Paste Time	[Ctrl]/[Command]-[Shift]-[V]
Record Enable	[R]
Redo	[Ctrl]/[Command]-[Shift]-[Z]
Repeat	[Ctrl]/[Command]-[K]
Right Selection Side to Cursor	[D]
Select All	[Ctrl]/[Command]-[A]
Select None	[Ctrl]/[Command]-[Shift]-[A]
Snap On/Off	[J]
Solo	[S]
Split At Cursor	[Alt]/[Option]-[X]
Split Range	[Shift]-[X]
Undo	[Ctrl]/[Command]-[Z]
Ungroup	[Ctrl]/[Command]-[U]
Unlock	[Ctrl]/[Command]-[Shift]-[U]
Unmute Events	[Shift]-[U]

Editors category

Option	Key command
Show/Hide Infoview	[Ctrl]/[Command]-[I]
Show/Hide Inspector	[Alt]/[Option]-[I]
Show/Hide Overview	[Alt]/[Option]-[O]

File category

Option	Key command
Close	[Ctrl]/[Command]-[W]
New	[Ctrl]/[Command]-[N]
Open	[Ctrl]/[Command]-[O]
Quit	[Ctrl]/[Command]-[Q]
Save	[Ctrl]/[Command]-[S]
Save As	[Ctrl]/[Command]-[Shift]-[S]
Save New Version	[Ctrl]/[Command]-[Alt]/[Option]-[S]
Toggle Alternate Key Commands	[#] or [Ctrl]/[Command]-[F5]

Media category

Option	Key command
Open MediaBay	[F5]
Preview Cycle On/Off	[Shift]-[Pad [/]
Preview Start	[Shift]-[Enter]
Preview Stop	[Shift]-[Pad [0]
Search MediaBay	[Shift]-[F5]

MIDI category

Option	Key command
Quantize	[Q]

Navigate category

Option	Key command
Add Down: Expand/Undo selection in the Project window to the bottom/ Move selected event in the Key Editor down 1 octave	[Shift]-[Down Arrow]
Add Left: Expand/Undo selection in the Project window/Key Editor to the left	[Shift]-[Left Arrow]
Add Right: Expand/Undo selection in the Project window/Key Editor to the right	[Shift]-[Right Arrow]
Add Up: Expand/Undo selection in the Project window to the top/Move selected event in the Key Editor up one octave	[Shift]-[Up Arrow]
Down: Select next in the Project window/ Move selected event in the Key Editor one semitone down	[Down Arrow]
Left: Select next in the Project window/ Key Editor	[Left Arrow]
Right: Select next in the Project window/ Key Editor	[Right Arrow]
Up: Select next in the Project window/ Move selected event in the Key Editor one semitone up	[Up Arrow]
Bottom Select bottom track in the track list	[End]
Top: Select top track in the track list	[Home]
Toggle Selection	[Ctrl]/[Command]-[Space]

Nudge category

Option	Key command
End Left	[Alt]/[Option]-[Shift]-[Left Arrow]
End Right	[Alt]/[Option]-[Shift]-[Right Arrow]
Left	[Ctrl]/[Command]-[Left Arrow]
Right	[Ctrl]/[Command]-[Right Arrow]
Start Left	[Alt]/[Option]-[Left Arrow]
Start Right	[Alt]/[Option]-[Right Arrow]

Project category

Option	Key command
Open Browser	[Ctrl]/[Command]-[B]
Open Markers	[Ctrl]/[Command]-[M]
Open/Close Pool	[Ctrl]/[Command]-[P]
Open Tempo Track Editor	[Ctrl]/[Command]-[T]
Setup	[Shift]-[S]
Show/Hide Track Colors	[Shift]-[C]

Tool category

Option	Key command
Delete tool	[5]
Draw tool	[8]
Drumstick tool (Nuendo Expansion Kit only)	[0]
Glue tool	[4]
Mute tool	[7]
Next Tool	[F10]
Play tool	[9]
Previous Tool	[F9]
Range tool	[2]
Select tool	[1]
Split tool	[3]
Zoom tool	[6]

Transport category

Option	Key command
Auto Punch In	[I]
Auto Punch Out	[O]
Cycle	Pad [/]
Exchange time formats	[.]
Fast Forward	[Shift]-Pad [+]
Fast Rewind	[Shift]-Pad [-]
Forward	Pad [+]
Input Left Locator	[Shift]-[L]
Input Position	[Shift]-[P]
Input Right Locator	[Shift]-[R]
Input Tempo	[Shift]-[T]
Insert Marker	[Insert] (Win)
Locate Next Event	[N]
Locate Next Marker	[Shift]-[N]
Locate Previous Event	[B]
Locate Previous Marker	[Shift]-[B]
Locate Selection	[L]
Locators to Selection	[P]
Loop Selection	[Shift]-[G]
Metronome On	[C]
Nudge Cursor Right	[Ctrl]/[Command]-Pad [+]
Nudge Cursor Left	[Ctrl]/[Command]-Pad [-]
Panel (Transport panel)	[F2]
Play Selection Range	[Alt]/[Option]-[Space]
Recall Cycle Marker 1 to 9	[Shift]-Pad [1] to Pad [9]
Record	Pad [*]
Retrospective Record	[Shift]-Pad [*]
Return to Zero	Pad [,] or Pad [.,] or Pad [;]
Rewind	Pad [-]
Set Left Locator	[Ctrl]/[Command]-Pad [1]
Set Marker 1	[Ctrl]/[Command]-[1]
Set Marker 2	[Ctrl]/[Command]-[2]
Set Marker 3 to 9	[Ctrl]/[Command]-Pad [3] to [9] or [Ctrl]/[Command]- [3] to [9]
Set Right Locator	[Ctrl]/[Command]-Pad [2]
Start	[Enter]
Start/Stop	[Space]
Stop	Pad [0]

Option	Key command
To Left Locator	Pad [1]
To Marker 1	[Shift]-[1]
To Marker 2	[Shift]-[2]
To Marker 3 to 9	Pad [3] to [9] or [Shift]-[3] to [9]
To Right Locator	Pad [2]
Use External Sync	[T]

Windows category

Option	Key command
Inline: Key Commands	[Shift]-[F4]
Inline: Settings	[Shift]-[F3]
Inline: View Layout	[Shift]-[F2]
Lock/Unlock Active Workspaces	[Alt]/[Option]-Pad [0]
New	[Ctrl]/[Command]-Pad [0]
Organize	[W]
Workspace 1 to 9	[Alt]/[Option]-Pad [1] to [9]

Workspace category

Option	Key command
Lock/Unlock Active Workspace	[Alt]/[Option]-Pad [0]
New	[Ctrl]/[Command]-Pad [0]
Organize	[W]
Workspace 1-9	[Alt]/[Option]-Pad [1-9]

Zoom category

Option	Key command
Zoom Full	[Shift]-[F]
Zoom In	[H]
Zoom In Tracks	[Alt]/[Option]-[Down Arrow]
Zoom Out	[G]
Zoom Out Tracks	[Alt]/[Option]-[Up Arrow] or [Ctrl]/[Command]-[Up Arrow]
Zoom to Event	[Shift]-[E]
Zoom to Selection	[Alt]/[Option]-[S]
Zoom Tracks Exclusive	[Z] or [Ctrl]/[Command]- [Down Arrow]

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